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# Flexible Vinyl and Urethane Coating and Printing Background Information for Promulgated Standards

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Research Triangle Park, NC

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Office of Air Quality
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# Flexible Vinyl and Urethane Coating And Printing—Background Information for Promulgated Standards

Final
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16. ABSTRACT

Standards of performance to control emissions of volatile organic compounds from flexible vinyl and urethane coating and printing operations are being promulgated under the Authority of Section 111 of the Clean Air Act. These standards apply to flexible vinyl and urethane printing lines for which construction, modification, or reconstruction began on or after January 18, 1983.

This document contains a summary of public comments, EPA responses, and a discussion of differences between the proposed and promulgated standards of performance.

17. KEY WORDS AND DOCUMENT ANALYSIS

| a. DESCRIPTORS | b. IDENTIFIERS/OPEN ENDED TERMS | c. COSATI Field/Group |
|---|---|---|
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# Flexible Vinyl and Urethane Coating and Printing—Background Information for Promulgated Standards

Emission Standards and Engineering Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

June 1984

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ENVIRONMENTAL PROTECTION AGENCY

Background Information
Final Environmental Impact Statement
for Flexible Vinyl and Urethane Coating and Printing

Prepared by:

Jack R. Farmer

6/11/84
(Date)

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Director Emission Standards and Engineering Division
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Research Triangle Park, North Carolina 27711

1. The promulgated standards of performance will limit emissions of volatile organic compounds (VOC) from new, modified, and reconstructed flexible vinyl and urethane coating and printing operations. Section 111 of the Clean Air Act (42 U.S.C. 7411), as amended, directs the Administrator to establish standards of performance for any category of new stationary source of air pollution that ". . . causes or contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare."

2. Copies of this document have been sent to the following Federal Departments: Office of Management and Budget; Labor, Health and Human Services, Defense, Transportation, Agriculture, Commerce, Interior, and Energy; the National Science Foundation; the Council on Environmental Quality; members of the State and Territorial Air Pollution Program Administrators; the Association of Local Air Pollution Control Officials; EPA Regional Administrators; and other interested parties.

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# 1.0 SUMMARY

On January 18, 1983, the Environmental Protection Agency (EPA) proposed standards of performance for flexible vinyl coating and printing operations (48 FR 2276) under authority of Section 111 of the Clean Air Act. On October 11, 1983, the proposal was extended (48 FR 46224) to cover coating and printing of urethane webs. At promulgation, the source category was renamed "flexible vinyl and urethane coating and printing." Both Federal Register notices requested public comments. Twelve comment letters were received on the original proposal. Four were from vinyl printers, one was from an ink manufacturer, one from a printer of urethane products, one from a manufacturer of flexible packaging, one from a manufacturer of carbon adsorbers, and two from vinyl printing trade associations. The comments that were submitted, along with responses to these comments, are summarized in this document. The summary of comments and responses serves as the basis for the revisions made to the standard between proposal and promulgation. No comments were received concerning extension of the proposal to cover coating and printing of urethane webs.

## 1.1 SUMMARY OF CHANGES SINCE PROPOSAL

In response to public comments received on the proposed rulemaking and as a result of EPA reevaluation, six major changes were made in the proposed standard prior to promulgation. The changes involved (1) expanding the applicability of the standard to include printing on urethane sheets or urethane coated webs as well as on vinyl sheets or vinyl coated webs, (2) the addition of considerations for petitioning the Administrator to show compliance using an inventory-type system to account for VOC content of waterborne inks, (3) the addition of compliance provisions for incineration, (4) the revision of the averaging period for compliance using waterborne inks, (5) the addition of semiannual reporting requirements for conditions when monitored parameters exceed levels observed during a performance test, and (6) redefining "flexible vinyl and urethane products" to exempt flexible packaging.

The title of the standard, the definition of affected facility in Section 60.580, and various definitions in Section 60.581 were revised for clarification and to reflect the application of the standard to printing of urethane sheets or urethane coated webs. A major urethane manufacturer commented that there were no technical or scientific reasons for the printing of flexible urethane coated fabrics or urethane sheets to be regulated any differently than the printing of flexible vinyl coated fabrics or vinyl sheets. Urethane and vinyl products are commonly printed as a continuous web on rotogravure equipment. The standard, which reflects the best demonstrated technology (BDT) for the vinyl industry, also reflects BDT for the urethane industry. Thus, the applicability of the standard has been expanded to include the printing of flexible urethane coated fabrics or urethane sheets.

A list of considerations for petitioning the Administrator for permission to use an inventory-type system to account for volatile organic compounds (VOC) in waterborne inks was added in Section 60.583(c). Such a system would allow the operator to account for the VOC and ink solids content using inventory and purchase records for the entire averaging period rather than having to account for each ink as used at the print head. Such a system would also facilitate the use of recycled waterborne inks by allowing the operator to determine VOC and ink solids content for new inks and diluent solvent directed to the print line during the averaging period and to subtract the VOC discarded with unused ink.

For compliance using waterborne inks, the averaging period was redefined in Section 60.583(b). This change was made to allow plants that keep records on a quarterly system where each quarter consists of two 4-week periods and one 5-week period to use a 5-week averaging period four times per year.

Provisions have been added in Section 60.583(d) for compliance with the VOC percent reduction standard using incineration. Accordingly, monitoring requirements for both thermal and catalytic incineration have been added to Section 60.584(b) and (c). The inclusion of provisions for incineration give vinyl and urethane printers the option to choose an incinerator as a

control device for operations using solvents that are not compatible with carbon adsorption.

Finally, Section 60.585 was added containing semiannual reporting requirements. The section states that owners or operators must report semiannually any exceedances of the waterborne ink limitations or deviations from the monitored parameters for carbon adsorption or incineration listed in Section 60.584. Reporting requirements were added to facilitate enforcement of the standard.

## 1.2 SUMMARY OF IMPACTS OF PROMULGATED ACTION

### 1.2.1 Alternatives to the Promulgated Action

Regulatory alternatives considered in the development of the standard are discussed in Chapter 6 of "Flexible Vinyl Coating and Printing Operations - Background Information for Proposed Standards," EPA-450/3-81-016a, January 1983. [This document is also referred to as the Background Information Document (BID).] These regulatory alternatives reflect different levels of emission control. One was selected that represents the best demonstrated technology, considering costs, nonair quality health, and environmental and economic impacts for flexible vinyl coating and printing operations. These alternatives remain the same.

### 1.2.2 Environmental Impacts of Promulgated Action

The environmental impacts of the proposed standard are discussed in Chapter 7 of the BID. A review of these environmental impacts indicated no changes were necessary, and therefore, the impacts remain unchanged since proposal. The Agency has not performed an extensive investigation of the environmental impacts of including printing on urethane products. However, considering the similarities in the printing processes, the Agency has no information which indicates that significant adverse impacts will occur as a result of including urethane products. Public comments were solicited on this issue, but none were received.

The review of the environmental impacts discussed in the proposal BID constitutes the final Environmental Impact Statement.

1.2.3 Energy and Economic Impacts of the Promulgated Action

The energy and economic impacts of the proposed standard are discussed in Chapters 7 and 9, respectively, of the BID. These impacts reflect the use of carbon adsorption control equipment. A review of the energy and economic impacts indicated no changes were necessary, and therefore, these impacts remain unchanged since proposal. Compliance provisions have been added for the use of incineration. For facilities that meet the standard using incineration, energy requirements and costs will increase but are still considered reasonable (IV-B-8).

As discussed in the previous section, EPA has not performed an extensive investigation of the energy and economic impacts of expanding the applicability of the standard to urethane products. Again, considering the similarities of the processes and the industries, the Agency has no indication of significant adverse impacts. Public comments were solicited on this issue.

1.2.4 Other Considerations

1.2.4.1 Irreversible and Irretrievable Commitment of Resources. This impact is discussed in Chapter 7 of the BID and remains unchanged since proposal.

1.2.4.2 Environmental and Energy Impacts of Delayed Standards. These impacts are discussed in Chapter 1 of the BID and remain unchanged since proposal.

# 2. SUMMARY OF PUBLIC COMMENTS

The list of commenters, their affiliations, and the EPA docket number for each of the comments are shown in Table 2-1. Twelve letters commenting on the proposed standard and the Background Information Document (BID) were received. A public hearing was not held because it was not requested. The comments have been combined into the following 10 categories:

2.1 Selection of Source Category
2.2 Emission Control Technology
2.3 Modification and Reconstruction
2.4 Economic Impact
2.5 Selection of Best Demonstrated Technology
2.6 Selection of Format
2.7 Selection of Emission Limits
2.8 Legal Considerations
2.9 Test Methods and Monitoring
2.10 Reporting and Recordkeeping

The comments and responses are discussed in the following sections of this chapter. A summary of changes made in the regulation is included in Chapter 1. The docket reference is indicated in parentheses in each comment.

## 2.1 SELECTION OF SOURCE CATEGORY

2.1.1 Comment: One commenter[1] (IV-D-7) writing on behalf of the Chemical Film and Fabrics Association (CFFA), a trade association representing 60 percent of the flexible vinyl coating and printing industry, felt that EPA had failed to show that emission controls for the vinyl industry are

[1] CFFA's comments were adopted by the Wallcovering Manufacturers Association (IV-D-9) and by Uniroyal, Inc. (IV-D-10).

TABLE 2-1. LIST OF COMMENTERS ON THE PROPOSED STANDARD OF PERFORMANCE FOR FLEXIBLE VINYL AND URETHANE COATING AND PRINTING OPERATIONS

| Commenter | Docket Entry Number[a] |
|---|---|
| Mr. Henry R. Lasman<br>Compo Industries, Inc.<br>200 Market Street<br>Lowell, Massachusetts 01852 | IV-D-1 |
| Mr. D.R. Roeing<br>Croda Inks Corporation<br>777 North Merimac Avenue<br>Niles, Illinois 60648 | IV-D-2 |
| Mr. Robert K. Pfeiffer<br>Union Carbide Corporation<br>P.O. Box 49287<br>Atlanta, Georgia 30359 | IV-D-3 |
| Mr. L.C. Tropea, Jr.<br>Reynolds Aluminum<br>Reynolds Metals Company<br>Richmond, Virginia 23261 | IV-D-4 |
| Mr. Donald Dean<br>Imperial Manufacturing Company<br>P.O. Box 280<br>Plattsburgh, New York 12901 | IV-D-5 |
| Mr. C. Richard Springer<br>Borden, Inc.<br>165 N. Washington Avenue<br>Columbus, Ohio 43215 | IV-D-6 |
| Mr. W. Caffey Norman<br>Chemical Film and Fabrics Association<br>Cleary, Gottlieb, Steen and Hamilton<br>1752 N Street, N.W.<br>Washington, D.C. 20036 | IV-D-7 |
| Mr. F.P. Partee<br>Ford Motor Company<br>One Parklane Boulevard<br>Dearborn, Michigan 48126 | IV-D-8 |

(continued)

TABLE 2-1. CONTINUED

| Commenter | Docket Entry Number[a] |
|---|---|
| Mr. Robert E. Hebda (adopted comments in D-7)<br>Mr. David C. Murchison<br>Wallcovering Manufacturers Association<br>Howrey and Simon<br>1730 Pennsylvania Avenue, N.W.<br>Washington, D.C. 20006 | IV-D-9 |
| Mr. Robert C. Niles (adopted comments in D-7)<br>Uniroyal, Inc.<br>Middlebury, Connecticut 06749 | IV-D-10 |
| Mr. Richard T. Paul<br>Wallcovering Manufacturers Association<br>666 Morris Avenue<br>Springfield, New Jersey 07081 | IV-D-13 |
| Mr. Charles M. Stockinger<br>Chemical Film and Fabrics Association, Inc.<br>1230 Keith Building<br>Cleveland, Ohio 44115 | IV-D-14 |

[a]These designators represent docket entry numbers for docket number A-80-8. These documents are available for public inspection at: U.S. Environmental Protection Agency, Central Docket Section, West Tower Lobby, Gallery 1, Waterside Mall, 401 M Street, S.W., Washington, D.C. Docket entries IV-D-11 and IV-D-12 are not included in this list because these comments were received and responded to before proposal of the standard.

needed or will result in any significant reduction of air pollution which may reasonably be anticipated to endanger public health or welfare. He felt that there is no statutory authority for proceeding with the development of this new source performance standard (NSPS) because little or no new growth is expected and the source is not a "significant contributor" to air pollution.

The association (IV-D-7) made several points in their letter regarding growth of the industry. The association's representative noted that EPA's action in discontinuing the development of an NSPS for the mineral wool industry provides a precedent for discontinuing action on the vinyl printing NSPS. He explained that the overall growth trend in the industry is negative and U.S. market shipments [Standard Industrial Code (SIC) 2295] declined steadily from 1972 to 1980. He felt that the BID's estimate of six new sources in the wallcovering segment which accounts for 7 percent of the industry sales was based on the questionable assumptions that the 60 percent 1979 average capacity utilization would not change and that the annual growth rate would be 8.9 percent. He stated that it would have been more reasonable to assume that the 1979 excess capacity would have been utilized as has been the case from 1979 to 1982. His members have reported a decline in wallcovering production and sales during this period. No new sources have been constructed and several advanced print lines in the industry have been permanently shut down.

The CFFA's representative (IV-D-7) also pointed out that, according to the Control Techniques Guideline (CTG) for fabric coating, VOC emissions for vinyl coating currently represent less than 0.2 percent of nationwide VOC emissions. He noted that this is a negligible contribution to nationwide VOC emissions, and the increase in VOC emissions of even six new sources in the vinyl industry over the next 5 years would appear to be insignificant for the purpose of EPA's determination of whether NSPS should be developed for the industry.

For these reasons, CFFA suggested that EPA reconsider the need for the proposed standard.

After the public comment period closed, the Wallcovering Manufacturers Association (WMA) commented (IV-D-13) regarding perceived inaccuracies in the growth projections. Their comments, with which CFFA later agreed (IV-D-14), were based on EPA's post-proposal docket entry (IV-B-2) adding new data on growth projections supplied by WMA and EPA's analysis of these data. WMA addressed six areas of concern (IV-D-13).

1. EPA's background information document (BID) overstated the number of firms which might enter the wallcovering industry in the next 4 years because it inappropriately used past sales data to project industry capacity for the period 1979-1987.

2. The 8.9 percent growth rate hypothesized in the BID is overstated. WMA felt that the growth rate was based on reported industry sales between 1971 and 1979 and thus ignored the downward trend in sales between 1980 and 1982.

3. In determining a projected growth rate, the BID made no effort to analyze how projected changes in important economic variables might affect the demand for wallcovering in the 1980s. WMA listed variables such as competition from other types of wall finishes, growth in imported products, competitive viability of existing producers, housing starts, nonresidential construction, and the remodeling market.

4. The updated growth projections (IV-B-2) used an inappropriate method to calculate the growth in sales over the 1975-1982 period. That report used an average of each individual percentage change in sales over the 1975-1982 period. WMA added that the standard compound growth rate is more accurate for forecasting purposes and noted that the compound method was used in the BID.

5. The updated growth projections (IV-B-2) misused the data supplied by WMA. That report incorrectly assumed that the total number of companies reporting to WMA all produced vinyl wallcovering. They did not. Therefore, WMA felt that the projections (IV-B-2) incorrectly calculated the average sales of vinyl wallcovering per respondent. WMA included a table showing the number of companies which reported vinyl wallcovering sales and the actual average sales per respondent.

6. Inconsistencies exist between the BID and the updated growth projections (IV-B-2). Specifically, WMA listed the number of wallcovering firms, the wallcovering production capacity for 1982, and the average capacity per firm in the industry.

WMA concluded that both the BID and the updated growth projections (IV-B-2) were incorrect in projecting the entry of six new firms from 1982 through 1987. Rather, WMA felt that it is unlikely that any new firms will enter the wallcovering industry in the next few years. WMA felt that regulatory action should not be based on either the BID or the updated growth projections (IV-B-2).

The CFFA's second letter (IV-D-14) voiced concurrence with WMA, adding that an error was made in the BID regarding statistical information provided by CFFA on the aggregate value of wallcovering shipments. CFFA noted that they provided EPA with the aggregate value of wallcovering shipments by reporting members, and estimated that its members represented approximately 60 percent of the overall vinyl coating and printing industry. CFFA stated that EPA had twice increased the value of shipments to reflect the total market, first on page 9-13 of the BID and again on page 9-20. CFFA added that this error would change the forecast of the number of new sources projected for the industry. They projected an increase of only one new source. CFFA concluded that they joined with WMA in the feeling that regulatory action should not be based on the growth projections in the BID or the analysis in IV-B-2.

Response: There is statutory authority and, indeed, a requirement to proceed with the promulgation of this NSPS. Section 111 of the Clean Air Act requires that the Administrator establish standards of performance for categories of new, modified, or reconstructed stationary sources that in the Administrator's judgment cause or contribute significantly to air pollution that may reasonably be anticipated to endanger public health or welfare. Standards of performance prevent new air pollution problems from developing by requiring application of the best technological system of continuous emission reduction that the Administrator determines to be adequately demonstrated. The 1977 Amendments to the Clean Air Act added the words, "in

the Administrator's judgment," and the words, "may reasonably be anticipated," to the statutory test. The legislative history for these changes stresses two points.

- The Act is preventive, and regulatory action should be taken to prevent harm before it occurs; and
- the Administrator should consider the cumulative impact of all sources and not just the harm from a single class of sources.

[H.R. Rep. No. 95-294, 95th Congress, 1st Session, 49-50 (1977).]

The 1977 Amendments to the Clean Air Act also required that the Administrator promulgate a priority list of source categories for which standards of performance are to be promulgated. The priority list, 40 CFR 60.16, was promulgated in the Federal Register August 21, 1979 (44 FR 49225). Development of the priority list was initiated by compiling data on a large number of source categories from literature sources. Major stationary source categories were then subjected to a priority ranking procedure using the three criteria specified in Section 111(f) of the Act. The procedure ranks source categories on a pollutant-by-pollutant basis. In this ranking, first priority was given to the quantity of emissions, second priority was given to the potential impact on health or welfare, and third priority was given to the mobility and competitive nature of the source category.

In light of the considerations stated above, the Administrator found that the fabric coating industry is a "significant contributor." (Applying the criteria for prioritizing such contributors, the Administrator ranked the fabric coating industry, of which vinyl printing is the largest organic solvent using segment, 10th of 59 source categories on the priority list.) This listing decision requires the Agency to promulgate standards of performance for new sources in the category.

In regard to growth anticipated in the flexible vinyl printing industry, EPA evaluated the growth rate using the WMA data (IV-B-2) and still maintains the position described in a letter to CFFA in March 1982 (II-C-89); that is, the short-term growth picture for wallcovering plants has worsened during the last couple of years, as is true for many

manufacturing industries in today's economy. Decline in housing starts and construction of commercial buildings has certainly been the major factor in slowing the production of wallpaper. However, before the market began to slump, there was considerable growth in wallcovering shipments; and it can be expected to continue when the Nation's economy recovers. Therefore, the Agency believes that growth projections based on today's economic conditions and on utilization of existing plant capacity are inappropriate. Instead, longer-term estimates should more accurately reflect the growth potential for this industry. In NSPS development, a 5-year period is generally selected on which to base environmental, economic, and energy analyses. This standardizes the reporting of impacts in the regulation development process, but should not be viewed as a limiting factor in EPA's decision as to whether a particular standard is warranted. Therefore, predicting on the basis of today's economy the number of wallcovering plants which will be built in the next 5 years, is not as relevant as the fact that long-term growth is expected to be strong, indicating that some number of plants or new lines will definitely be constructed in the future.

The mineral wool industry was deleted from the priority list (47 FR 950, January 8, 1982) because, after a rapid industry expansion in the late 1970's, market conditions in the early 1980's indicated that an anticipated further increase in demand had not developed and that the industry was operating at about 60 percent of capacity. EPA estimated that only one new mineral wool plant might be built before 1985. In addition, there were no expansions or modifications expected to occur in the mineral wool industry during the 5-year period. On the other hand, some commenters (IV-D-7,[1] IV-D-8) gave an indication that process modifications and replacement of certain pieces of equipment (e.g., drying ovens) will occur in the vinyl printing industry, thus submitting these sources to the NSPS. Therefore, the Administrator does not agree with the commenter's statement that the mineral wool industry provides a precedent for discontinuing action on the proposed NSPS for flexible vinyl coating and printing.

In regard to the use of excess capacity in the vinyl industry, EPA has no evidence to indicate that technological improvement will significantly

reduce downtime or that any resulting increase in production will offset production ascribed to new plants. The Agency expects, as the economic recovery and the demand for wallcovering increases, the wallcovering industry will continue to experience a considerable amount of downtime ranging from 40 to 75 percent. This downtime is required for color changes, quality control, and cleanup.

The background information document (BID) quotes the CTG stating that uncontrolled vinyl printing emissions are about 36,000 megagrams/year (40,000 tons/year). During the development of the BID, potential uncontrolled emissions were estimated as 61,700 megagrams/year (68,000 tons/year). Nationwide in the year 1987, the NSPS would reduce VOC emissions from new, modified, and reconstructed print lines by 790 megagrams (870 tons) beyond the emission level required by State regulations. No stationary source category accounts for more than about 2 or 3 percent of the Nation's total VOC emissions, and most contribute 1 percent or less. Thus, nationwide reductions in VOC emissions can be achieved only by controlling many different sources which may be small sources in absolute terms, but large relative to other VOC emitters.

The following discussion responds to the six areas of concern expressed in WMA's letter (IV-D-13):

1. EPA incorrectly projected six new firms. EPA did not project six new firms, but rather projected six new sources. Neither the background information document (BID) nor the updated growth projections (IV-B-2) ever mentions firms. A new source means a new rotogravure printing line, not a new firm or even necessarily a new plant of an existing firm.

The actual number of new sources could vary between two and six, depending on the assumptions one accepts. The number of new sources is a function of two critical assumptions: the starting capacity utilization rate for the industry and the average capacity utilization rate of a new source. In the BID, the starting rate and average rate were assumed equal based on engineering estimates of the downtime of a new line for color and ink changes, etc. (see page 6-3 of the BID). Nonetheless, varying the assumptions does not significantly alter the conclusions as a simple sensitivity analysis reveals.

Table 2-2 displays excess capacity as a function of different capacity utilization rates for the projection period. Assuming that the average new source would have a capacity of 15 million square meters; that the average capacity utilization of a new source would be 100 percent (the assumption made by WMA); and that the starting capacity utilization rate is 60 percent; then two new sources would be needed by 1987. A further assumption that the average capacity utilization rate can vary as well as the starting rate results in the number of new sources for each scenario by 1987 as shown in Table 2-3.

Given that the data supplied by WMA imply a starting capacity utilization rate of 72 percent in 1979 (Table 2-4), then the number of new sources is likely to be between three and five (i.e., a starting capacity utilization rate between 70 and 80 and a average capacity utilization rate per new source between 80 and 100 (Table 2-3). Although this interval estimate of three to five new sources may be preferable to the point estimate of six new sources reported in the BID, the basic conclusion that there will be new sources is unaltered.

2. The growth rate of 8.9 percent used in the BID is overstated. WMA claims that the growth rate is overstated because EPA failed to take account of the downward trend in 1980-82. First, data for 1980-82 were not available when the BID was submitted. Second, the data supplied by WMA actually yield a higher growth rate of 9.12 percent when 1980-82 data are included, as shown in Table 2-4.

Table 2-4 indicates how volatile or changeable the WMA data are, suggesting that the recent decline can reverse itself rather quickly. For this reason, the average annual rate of change (9.12 percent) is used rather than a compound rate. A compound rate is appropriate only when the data are relatively smooth and change in an exponential fashion. In this case, the data are too volatile to be properly represented in this manner, and the average annual percentage change is more appropriate.

Figure 2-1, which graphically portrays the average sales per respondent over the 1975-82 period, illustrates the different results obtained when a compound rate is used. The compound rate of 6.7 percent computed by WMA

TABLE 2-2. EXCESS CAPACITY STARTING WITH DIFFERENT CAPACITY UTILIZATION RATES

| Year | Output (Millions Of Sq. Meters) | Excess Capacity Starting With A Capacity Utilization Of 60% | 70% | 80% | 90% |
|---|---|---|---|---|---|
| 1979 | 77.78 | 51.8 | 33.3 | 19.4 | 8.6 |
| 1980 | 84.70 | 44.9 | 26.4 | 12.5 | 1.7 |
| 1981 | 92.24 | 37.4 | 18.9 | 5.0 | (5.8) |
| 1982 | 100.45 | 29.2 | 10.7 | (3.3) | (14.1) |
| 1983 | 109.39 | 20.2 | 1.7 | (12.2) | (23.0) |
| 1984 | 119.13 | 10.5 | (8.0) | (21.9) | (32.7) |
| 1985 | 129.73 | (0.1) | (18.6) | (32.5) | (43.3) |
| 1986 | 141.27 | (11.7) | (30.2) | (44.1) | (54.9) |
| 1987 | 153.85 | (24.3) | (42.8) | (56.7) | (67.5) |

TABLE 2-3. ESTIMATED NUMBER OF NEW SOURCES BY 1987

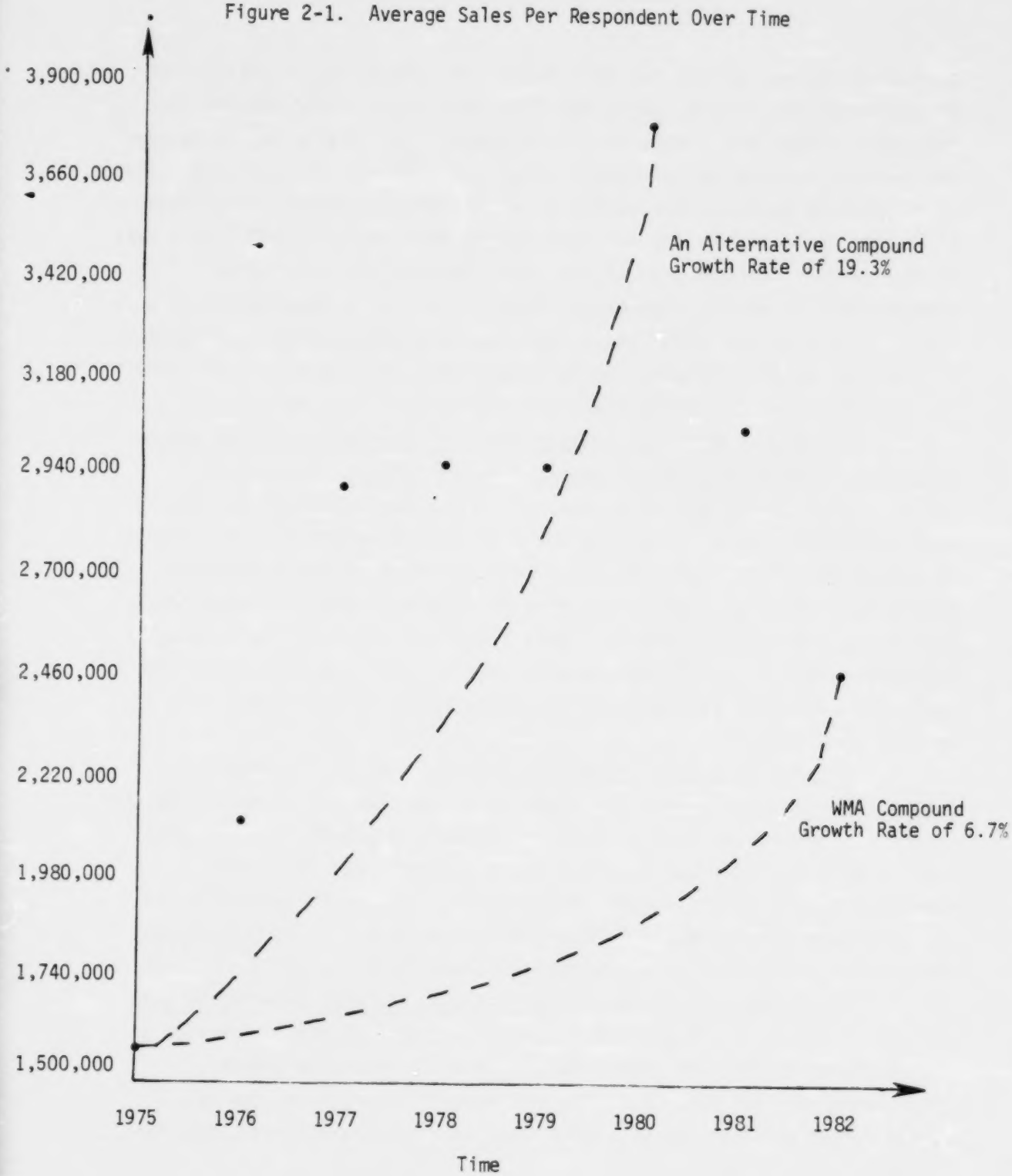
| Average Capacity Utilization[a] | Excess Capacity Starting At A Capacity Utilization Rate Of 60% | 70% | 80% | 90% |
|---|---|---|---|---|
| 80% | 2 | 4 | 5 | 6 |
| 85% | 2 | 3 | 5 | 5 |
| 90% | 2 | 3 | 4 | 5 |
| 100% | 2 | 3 | 4 | 5 |

[a]The average new source is assumed to have a capacity of 15 million square meters.

TABLE 2-4. AVERAGE SALES PER RESPONDENT: 1976 - 1982

| Year | Average Sales Per Respondent (In Rolls) | Percent Change From Previous Year | Implied Capacity Utilization |
|---|---|---|---|
| 1976 | 2,131,894 | 34.75% | 52% |
| 1977 | 2,943,969 | 38.09 | 71 |
| 1978 | 2,960,263 | 0.55 | 71 |
| 1979 | 2,963,664 | 0.12 | 72 |
| 1980 | 3,820,194 | 28.90 | 92 |
| 1981 | 3,053,089 | -20.08 | 74 |
| 1982 | 2,485,833 | -18.58 | 60 |
| | Average | 9.12% | 79% |

Figure 2-1. Average Sales Per Respondent Over Time



completely ignores all but two data points and, therefore, is misleading. WMA estimated the rate by taking the first data point (1975) and the last data point (1982) and solving for the compound rate. Such a method ignores the critical information in between, e.g., the 1980 high of 3,820,194. This rate cannot be taken as representative of the 1975-82 period. An alternative would be to compute the compound rate between 1975 and 1980. This rate of 19.3 percent captures more of the trend than the WMA formulation. However, this is not representative either. The most representative rate to employ is the average annual percentage change, a method which incorporates all the data points including the relatively flat performance in 1977-1979. The average annual percentage change is 9.12 percent (see Table 2-4).

3. EPA made no effort to analyze important economic variables which might affect the demand for wallcovering in the 1980's. The type of analysis suggested by WMA would require a rather sophisticated econometric modeling effort. In addition, the costs of such an undertaking are likely to exceed the benefits considerably. Research on short-run forecasting models and experience suggest that sophisticated econometric forecasting models are often outperformed by simple linear projections. The simple projection used in the BID has the advantage of incorporating most of the variables WMA listed as important indirectly by employing a growth rate based on past data.

4. The updated growth projections (IV-B-2) used an inappropriate method to compute the growth rate. WMA indicated that the standard compound growth rate method was more accurate in computing a growth rate for forecasting purposes and noted that this was the method used in the BID. However, as previously discussed in paragraph 2, due to the volatility of the data submitted by WMA, EPA feels the average annual percentage change method used in the updated projections is appropriate.

5. The growth projections (IV-B-2) misused the data supplied by WMA. The data supplied by WMA were not misused. Rather, WMA did not provide all the necessary caveats concerning their data until after the growth projections were revised. When the data were first provided, the only caveat issued was that the data were based on a voluntary survey, and thus,

the number of respondents fluctuates from year to year. (This is the reason for using an average per respondent.) No mention was made of the reliability problem, i.e., the data are unreliable until the 1984 survey provides tentative 1983 data along with a more reliable 1982 sales figure. Accordingly, perhaps the 1982 figure should be disregarded. If it is, and if the compound growth rate is computed using the method espoused by WMA, then the growth rate would be 11.6 percent (or 13.7 percent using EPA's averaging method) rather than 9.12 percent. Also, no information was provided concerning how many WMA members were vinyl wallcovering producers. At the time WMA supplied the data, the Agency assumed that most of its members were vinyl wallcovering producers since there were no indications to the contrary. Their letter (IV-B-13) indicates, however, there are only about 20, not 55, producers.

Because the WMA data are highly sensitive to the number of reporting companies and because the mix of the reporting companies (i.e., large vs. small, those having a banner year vs. those not having a banner year, etc.) may be a function of the business cycle (and thus result in a volatile data set), EPA has severe reservations about using the WMA data. Nevertheless, if the data are used, results show between two and seven new sources, as demonstrated below.

Since no data with respect to operating rates have been provided to EPA since the BID was developed, a compromise might be to use the averages of the implied capacity utilization rates in Table 2-4. These rates are implied if one starts with 60 percent in 1982. The implied average is 70 percent and this is taken as the more likely rate in 1982.

Table 2-5 shows the projected WMA data. Assuming 20 (rather than 55) producers of vinyl wallcoverings with an average capacity of 3,551,190 rolls (total supply = 72,023,800) and that demand (2,485,833 x 20 = 49,716,660) increases at 9.12 percent, then there will be a short fall of 5.9 million rolls in 1987. This translates into two new sources. With the 11.6 percent growth rate (since the 1982 data are tentative), between four and five new sources are predicted. With the 13.7 percent growth rate (using the more appropriate averaging method), about seven new sources are predicted. Thus,

TABLE 2-5. PROJECTIONS OF THE WMA DATA

| Year | Demand (In Rolls) | Supply (In Rolls) | Excess Demand |
|---|---|---|---|
| 1982 | 49,716,660 | 71,023,800 | |
| 1983 | 54,250,819 | 71,023,800 | |
| 1984 | 59,198,494 | 71,023,800 | |
| 1985 | 64,597,397 | 71,023,800 | |
| 1986 | 70,488,679 | 71,023,800 | |
| 1987 | 76,917,247 | 71,023,800 | 5,893,447 |

even with these rather volatile data, between two and seven new sources would still be forecast.

6. Inconsistencies exist between the BID and the updated growth projections (IV-B-2). There are a few inconsistencies between the BID and the updated growth projections because two different data sets for two different time periods were supplied by two different trade groups. The BID used deflated dollar sales data for the 1971-1979 period supplied by the Chemical Film and Fabric Association, while the updated growth projections (IV-B-2) used the number of rolls of vinyl wallcovering for the 1975-1982 period supplied by WMA.

The other apparent inconsistencies that WMA believes exist, however, result from WMA's confusion between a new firm and a new source or plant. WMA pointed out that the updated growth projections (IV-B-2) used 55 producers while the BID used 11. The reasons for using 55 producers are discussed previously in paragraph 5. Moreover, the BID did not say there were only 11 producers. The number 11 was inferred by WMA by incorrectly dividing total capacity by the average size of a new source. This same confusion explains the apparent inconsistencies regarding average and total industry capacity.

CFFA noted in a second comment letter (IV-D-14) that statistical information on the aggregate value of wallcovering shipments presented in the BID had been increased incorrectly to reflect the entire market. Indeed, the value of shipments supplied by CFFA and reflecting 60 percent of the total market was increased to reflect the total market and then incorrectly increased a second time in a subsequent calculation presented in the BID. The total 1979 value of shipments (p. 9-13 and 9-20 in the BID) should be $210 million.

The error does not change the 8.9 percent growth rate, but it does result in a revised estimate of new sources. Depending on the capacity utilization rate used, the estimate of new sources ranges from one to three. The estimate of one new source is based on a very high capacity utilization rate of 97 percent. Three new sources would be forthcoming if a conservative capacity utilization rate of between 70 and 80 percent is used as

suggested by WMA. However, an average capacity utilization rate of 60 percent was used during the development of the BID and the Administrator feels this rate is still appropriate. A capacity utilization rate of 60 percent would result in the installation of more than three new sources.

In summary, the basic conclusions of the BID are unaltered. Varying both the starting and the average capacity utilization rates do nothing more than refine the estimate to be three to six new sources rather than a point estimate of six. If the WMA data were used given the accompanying caveats and volatility, between two and seven new sources would still be predicted.

Despite the error made in the BID regarding the value of shipments, the analyses show that there will be growth in this industry. The prediction of how many wallcovering lines will be built in the next 5 years is not as relevant as the fact that long-term growth is expected to be strong, indicating that some number of sources will be constructed in the future. In addition to new sources, the industry itself estimates that some existing sources anticipate making process and equipment modifications and replacing certain pieces of equipment; thus, these sources would be subject to the standard.

Also, the standard has other benefits in addition to reducing emissions beyond those levels required by current State regulations. Standards of performance establish a degree of national uniformity, which precludes situations in which some States may attract industries by relaxing air pollution standards relative to other States. They improve the efficiency of case-by-case determinations of Best Available Control Technology (BACT) for facilities located in attainment areas and Lowest Achievable Emission Rate (LAER) for facilities located in nonattainment areas, by providing documentation and a starting point for the basis of these determinations. This documentation results from the process of developing a standard of performance, which involves identification and comprehensive analysis of alternative emission control technologies, development of associated costs, evaluation and verification of applicable emission test methods, and identification of specific emission limits achievable with alternate technologies. For these reasons, VOC emissions from rotogravure printing of flexible vinyl and urethane have been selected for regulation under an NSPS.

2.1.2 Comment: One commenter (IV-D-6) requested that EPA reconsider the need for the regulation due to the substantial costs being imposed. He felt the costs would be in excess of those mentioned in the BID, but did not provide any information to support this statement.

Response: Cost analyses and impacts based on carbon adsorption control technology are summarized in the BID and the preamble to the proposed standard. Other comments (2.4.6 and 2.4.2.3) asked that EPA consider the effect of potential wastewater discharge surcharges and charges for off-site solvent recovery. Responses to these comments explain that these factors were considered. EPA has no additional cost information which would change the economic analysis or the assessment that costs of carbon adsorption control are reasonable.

As a result of several comments, EPA has analyzed the cost effectiveness of incineration as an alternative means of VOC control in this industry. This analysis appears at (IV-B-8). Costs of incineration were determined to be reasonable and compliance provisions for incineration were added to the regulation.

2.1.3 Comment: One commenter (IV-D-10) recommended that the NSPS be renamed "vinyl wallcovering" with the vinyl printing and coating industry addressed in a separate and applicable series of documents at a later date. He listed five reasons for this position. First, the only print line tested to demonstrate capture and control technology was printing wallpaper. Second, the only projected growth is in the wallpaper area. Third, there are fundamental differences between print lines utilized for wallpaper and other vinyl coated products such as print width and line speeds. Similarly, another commenter (IV-D-5) stated that the model plant parameters used to determine emission control standards were not representative of the entire wallcovering industry. Fourth, the control system of choice for wallpaper systems is carbon adsorbers and is the only system discussed in the BID. Other vinyl products operators would probably use an incinerator as a control device of choice because of multiple solvents, carbon blinding due

to plasticizers and operational flexibility. Finally, State Implementation Plan (SIP) regulations would require control substantially equal to the NSPS. He went on to explain that the use of a 65 percent emission reduction for the baseline is in error because 95 percent of existing facilities are required by SIPs to reduce emissions by 81 percent or better. A proper baseline would be 81 percent reduction, as reflected in most SIPs. Using an 81 percent emission reduction baseline requires that the environmental, energy and economic impacts be recalculated as they are grossly over-estimated as presented.

Response: The standard appropriately applies to the entire vinyl printing and coating industry. In regard to the commenter's remark that the only print line tested was printing wallcovering, the rotogravure printing processes are substantially the same with respect to fugitive emission generation and capture, regardless of the vinyl printed product produced. Factors which affect the emissions from a printing line include equipment design parameters such as configurations of the dryers and print stations, air velocities at the fugitive capture points, and process and product parameters such as solvent volatilities, resin types, web widths, line speeds, and run lengths. The most important equipment design factor in reducing VOC emissions by improved capture efficiency is design of the print heads and dryer to minimize exposure of the wet web as it travels from the print head to the dryer. To accomplish this, the print head can be almost completely enclosed by moveable doors or panels that can be readily opened for operator access. If these doors are panels made of transparent material, the print head will still be visible to the operator. The dryer can be designed so that the opening is very close to the point where the wet web leaves the print head. Air flows must be balanced so that significant velocity is maintained where the web leaves the print head and enters the dryer to assure that emissions enter the dryer rather than escape at this point. EPA believes that proper design of the print head - dryer relationship and associated air velocities are the key to achieving the demonstrated control efficiencies and that other parameters such as product type, web widths, line speeds, etc., have little effect on performance.

In a meeting of the Chemical Film and Fabrics Association (CFFA) and EPA (II-E-101), there appeared to be agreement that the main factor which affects the emissions from any flexible vinyl printing and coating print line is the design of the capture system. If the capture system is properly designed and operated, other equipment design and product parameters become much less important. Since the affected facility which prints wallcovering is the same rotogravure print line used to print other flexible vinyl products, a wallcovering rotogravure print line is representative of the industry. Most CFFA members present at the meeting apparently agreed with this position although disagreement was later expressed by CFFA (II-D-89). (EPA's response to the CFFA letter II-D-89 is found at II-C-73.) No test data have been presented to show that EPA's conclusion is inappropriate.

EPA visited several flexible vinyl coating plants (II-B-7, II-B-9, II-B-11, II-B-13 through 19, II-B-21, II-B-22, II-B-24, II-B-25) that manufactured a variety of vinyl printed products including wallcovering, furniture upholstery, automobile upholstery, window shades, and awnings. Information from these plant visits supported the conclusions that capture system design and operation is indeed the key to achieving 90 percent capture and that tests of a wallcovering print line are representative of the entire vinyl printing industry. Furthermore, EPA's experience with similar industries such as publication rotogravure printing indicates that capture efficiencies of 90 percent and greater have been demonstrated (IV-B-5).

The commenter's second point on industry growth has been discussed in the response to Comment 2.1.1. The commenter's third point addressed the effect of variation in product parameters such as print width and line speeds. As discussed above, the proper design of the capture system, rather than parameters such as web width and line speed, is the most important factor to achieving the demonstrated control efficiency. The Agency judges that such parameters do not significantly affect the overall VOC control efficiency demonstrated in the test on the wallcovering print line.

In response to the fourth point raised by the commenter, incineration and carbon adsorption were both described in Chapter 4 of the BID. Since carbon adsorption was the only control method in use in the industry during the development of the standard, the cost analyses in Chapter 8 were based on carbon adsorption. According to comments received after proposal of the NSPS, incineration is being considered by some vinyl printers and therefore a more detailed discussion of the use of incineration has been addressed in other sections, and compliance provisions for incineration have been added to the standard.

In regard to the commenter's fifth point, EPA does not agree that the baseline was improperly defined causing the impacts of the standard to be overestimated. The baseline for the proposed standard, however, was defined at 65 percent overall control based on the level of control most States, that must achieve the ambient air quality standard for ozone, were actually adopting. Although some States had the authority to enforce higher reduction requirements, it appeared that most were enforcing the 65 percent level. The 65 percent control level was based on the CTG for graphic arts - rotogravure and flexography, which States were allowed to apply to control emissions from the vinyl printing industry.

After studying each of the commenter's five points, the Administrator still believes that the standard appropriately applies to the entire vinyl printing and coating industry. The standard will not be limited to vinyl wallcovering as requested.

2.1.4 Comment: One commenter (IV-D-1) felt that it was a serious oversight that the proposed regulation covered the printing of flexible vinyl coated webs without reference to printing or finishing flexible urethane coated webs. The commenter, whose company produces both vinyl and urethane coated products, pointed out that the major difference between the two webs is the chemistry of the coating compounds composing the web. In one instance, these are plasticized polyvinyl chloride (PVC) compounds and in the other, flexible thermoplastic urethane polymers. The commenter noted that, regardless of the chemical composition of the coating, the webs are finished

by printing with solvent solutions of PVC, urethanes, and/or acrylic resins. The commenter stated that his company knew of no technical or scientific reasons why the printing of polyurethane coated fabrics should be regulated differently from the printing of flexible polyvinyl coated fabrics. He concluded by suggesting that the proposed standards for printing of flexible vinyl be revised to specifically include the printing of urethane coated fabrics.

Response: After some discussion of this issue with the commenter (IV-E-1, IV-E-7) to get more information on the process of printing on urethane webs, the Administrator believes that urethane product manufacturers can achieve the proposed emission standard at reasonable costs. Since the Agency had not investigated the environmental, energy, and economic impacts of the standard upon urethane product manufacturers, notice of this proposed change appeared in the Federal Register on October 11, 1983 at 48 FR 46224. This notice allowed for a 30-day public comment period and specifically requested comments regarding the impacts of the standard on urethane printers. No comments were received. The Administrator has concluded that the promulgated standard should include the coating and printing of both flexible vinyl and flexible urethane.

2.1.5 Comment: One commenter (IV-D-4, IV-E-4), a producer of flexible packaging, felt that the proposed regulation could be erroneously viewed to apply to sources producing flexible packaging products such as products consisting of a thin vinyl coating applied to aluminum or paper based substrates on rotogravure printing equipment. He gave facial tissue boxes as an example of this. He noted that EPA staff members had told him that the standard did not apply to flexible packaging. He said that the definitions of "affected facility" and "flexible vinyl products" hinged on a minimum thickness of 50 micrometers (0.002 inches), but that some of his company's flexible packaging products exceeded that thickness. He urged EPA to revise the final regulation to clearly state that it does not apply to the manufacture of flexible vinyl packaging. He suggested that this be done

by specifically excluding "flexible packaging" in the definition of "flexible vinyl products."

Response: After receiving this comment, EPA contacted the Flexible Packaging Association (IV-E-5) to ask for a definition of "flexible packaging." Although the Association representative explained that there was some disagreement within the Association about an exact definition, he gave the following definition: "Flexible packaging is the use of paper, film, or foil to package a product in such a manner that the packaging material itself generally takes the shape of its contents." The Association representative stated that most flexible packaging is less than 50 micrometers (0.002 inches) thick, but noted that some Association members have products up to 0.010 inches thick.

Although it appears that the flexible vinyl coating and printing process is similar to the flexible packaging process described by the commenter (IV-E-4), EPA did not obtain the technical or economic information to determine whether best demonstrated technology (BDT) for the flexible vinyl industry is also BDT for this segment of the flexible packaging industry. Therefore, the definition of "flexible vinyl and urethane products" has been revised to specifically exempt flexible packaging from this standard. However, the Agency is beginning to develop new source performance standards for the flexible packaging industry and the packaging process described by the commenter will be investigated in the near future. If the investigation shows that BDT for flexible vinyl is also applicable to this segment of the flexible packaging industry, then this standard will be revised to include this segment of the packaging industry.

2.2 EMISSION CONTROL TECHNOLOGY

2.2.1 Comment: One commenter (IV-D-3), a manufacturer of fluidized-bed carbon adsorbers, explained some features of his company's product noting that it could achieve recovery efficiencies of 95 percent or greater. In a telephone conversation (IV-E-2), this commenter expressed concern that the

preamble referred to fixed-bed carbon adsorbers as the basis of the standard.

Response: During the development of the standard, most existing vinyl printing facilities with carbon adsorbers used multiple fixed-bed adsorbers and therefore fixed-bed carbon adsorbers were described in the BID. It was not the Agency's intent to imply that fluidized-bed carbon adsorbers were not applicable. Methods used for controlling emissions of VOC from affected facilities are not limited to those discussed in the BID. Other control technologies may be used to control emissions as long as the emission limit is met. The Agency interprets this comment as further evidence of the recovery efficiency achievable by carbon adsorbers.

2.2.2 Comment: After having checked with carbon adsorber manufacturers, one commenter (IV-D-6) discussed several points with regard to the ability of carbon adsorbers to function effectively and achieve 95 percent control efficiency. First, he noted that a combination of methyl ethyl ketone (MEK) and methyl isobutyl ketone (MIBK) going to an adsorption system is significantly harder to adsorb and control than a single solvent, such as toluene. He added that additional controls would be needed to separate these solvents from water and that for these two solvents, the system must be constructed of stainless steel in lieu of carbon steel.

The commenter made three observations about manufacturers' efficiency guarantees of carbon adsorbers. First, he noted that since numerous operating variables such as humidity, air stream temperature and concentration, and length of time the carbon bed is in use, are encountered in the operation of a carbon adsorption system, one company would only guarantee its unit at 75 percent efficiency. Next, he noted that carbon adsorption systems would typically be oversized by 50 percent in order for another company to state that they would be willing to give a guarantee of 95 percent. According to the commenter, that manufacturer said that to maintain 95 percent efficiency, the carbon bed would need to be replaced in 1 to 1.5 years. He went on to say that because of the size of the carbon

adsorption system required for a possible approach to 95 percent efficiency, EPA's cost estimate was not realistic. He felt a realistic installed cost for a new carbon adsorption system, including the drier, would be about $1,500,000. This price would be for a system that could recover solvent which would be reusable in the process at the facility. The commenter's third observation about a manufacturer's carbon adsorber guarantee was that if the concentration of MIBK and MEK varies, as it does in actual operation, the initial guarantee would not be valid.

Response: After reexamination, it remains EPA's conclusion that carbon adsorbers function effectively and can achieve 95 percent control efficiency in this industry. The Agency agrees with the comment that a combination of MEK and MIBK would require multi-column distillation equipment if separation of these similar solvents is required. One example of a large plant used in the cost analysis presented in the BID did include multi-column distillation equipment. In the examples of smaller plants, however, the blend was used directly as virgin solvent.

Additional steps are required to separate most solvents from water, and for these two solvents, EPA agrees with the comment that the system must be constructed of stainless steel. The cost analysis done during the development of this standard and presented in the BID included costs for distillation equipment with a moisture removal system for the separation of water. Similarly, the costs included a system constructed of stainless steel.

The proposed standard was based on a carbon adsorber efficiency of 95 percent primarily because the efficiency of the carbon adsorber tested during the development of the standard ranged from 98.5 to 99.6 percent. The facts that the manufacturer guaranteed the unit to be 95 percent efficient and carbon adsorber efficiencies of 95 percent have been demonstrated in two other web coating industries (publication rotogravure printing and pressure sensitive tapes and labels) also support the basis of 95 percent.

Humidity, air stream temperature and concentration, and length of time the carbon bed is in use are bed design parameters that can all be

controlled so as to enable the carbon adsorber to achieve 95 percent efficiency. Chapter 4 of the BID describes how these parameters are controlled at existing carbon adsorbers in use by vinyl printers.

The commenter stated that in order to achieve 95 percent control efficiency the carbon bed must be oversized by 50 percent and that the carbon bed would need to be replaced in 1 to 1.5 years. Indeed, sizing of carbon beds is an important design parameter. In regard to bed life, an estimate of 3 years was used in the BID cost analysis based on industry experience with carbon adsorbers. However, more frequent bed replacement would not appreciably affect the estimated cost effectiveness of carbon adsorbers.

The commenter also noted that a realistic installed cost for a carbon adsorption system capable of recovering solvent that would be reusable in the process at the facility would be $1,500,000. The commenter did not give any size information. The BID cost analysis included a system capable of recovering reusable solvent for a cost of $1,250,000. Thus, if the commenter is referring to a carbon adsorption system sized for Model Plant C, the commenter's cost estimate supports the BID estimate within the Agency's level of accuracy.

The commenter observed that carbon adsorber guarantees would not be valid when the concentration of MIBK and MEK varies. It was not clear if the commenter was referring to relative concentrations of MIBK and MEK in a combination consisting only of these two solvents or if he was referring to the total concentration of the gas stream directed to the carbon adsorber. In regard to the relative concentrations of MIBK and MEK, a carbon adsorber would be designed to adequately handle the highest expected concentration of the component which is the more difficult to adsorb and desorb. If this "worst-case" concentration is not exceeded, the carbon adsorber should maintain optimum control.

The Agency found little data on what happens to carbon adsorption efficiency with extreme variations in concentrations. However, the cost analysis was based on typical ranges of concentration. The carbon adsorption system in the model plant analysis was sufficiently large to

handle the widest range of concentrations expected to occur. The fact that carbon adsorbers can maintain 95 percent efficiency is borne out by a statement made at the meeting of the National Air Pollution Control Techniques Advisory Council (NAPCTAC) (II-B-50) held to review this standard. At this meeting, one participant noted that his company

> ". . . has had extensive experience in the operation of carbon adsorption solvent recovery systems. At our Toledo, Ohio facility there is a system that has been operating for over 30 years. A recent analysis of the system efficiency showed that 95 percent control was obtained."

Similarly, the carbon adsorber manufacturer quoted above in Comment 2.2.1 noted that his company's equipment could achieve recovery efficiencies of 95 percent or greater.

Should a vinyl printer decide that carbon adsorption will not be feasible or desirable based upon some parameters of his operation, compliance provisions for incineration have been added to the regulation.

2.2.3 Comment: One commenter (IV-D-7)[1] discussed four problems associated with the applicability of carbon adsorbers to the entire vinyl industry. The first was the potential problem of fouling of the carbon beds by plasticizers released from vinyl coatings when heated above 300°F and by solvents such as dimethyl formamide which are incompatible with carbon adsorption. Reduced carbon bed life and special desorption techniques would add to the cost of the process. The next area of his concern included other technical problems associated with carbon adsorbers such as space requirements, maintenance, carbon replacement, distillation, risk of bed fires, and risk of total shutdown. The third problem was the cost and technical difficulty of distilling mixed solvents with close distillation temperatures. The fourth problem with carbon adsorption mentioned by the commenter was the potential inability of carbon adsorbers to achieve 95 percent efficiency in recovering emissions of a number of solvents used in this industry. He said that to maintain that efficiency where plasticizers and

solvents such as dimethyl formamide enter the bed, more frequent cycling, increased steam flow, and more frequent bed replacement would be necessary and would result in higher operating costs. The commenter concluded that other methods of emission control, particularly incineration, may be the only feasible technology in certain segments of the industry.

Response: This commenter presents process-specific and site-specific conditions that were not seen during the development of the standard. During the development of this standard, carbon adsorption was the only control method in use in this industry. Since several comments were received on incineration, the Agency examined the current status of this control technology in the vinyl printing industry by contacting the three plants listed in the commenter's letter. Of these, one (IV-E-11) is considering the use of incineration, one (IV-E-10) has considered it but has no current plans to install an incinerator, and one (IV-E-12) has firm plans to install an incinerator.

The Clean Air Act requires that each NSPS reflect "application of the best technological system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, . . .) the Administrator determines has been adequately demonstrated." Such technology is often referred to as "best demonstrated technology" or simply BDT. After studying the comments received, the Agency had to determine if there were some circumstances described where carbon adsorption could not be used and could not be considered BDT as it had been during the development of the standard. Because EPA found no vinyl printers using a control technology other than carbon adsoprtion, the only information available on which to base such a determination has come from contacts with vinyl printers who were or had considered incineration in favor of carbon adsorption and the comments received concerning incineration.

In the case of the plant considering incineration (IV-E-11), the contact explained that they have an incinerator, formerly used to control emissions from another process, that they may retrofit for control of emissions from a vinyl print line. As an example of conditions where

incineration would be preferable to carbon adsorption, this contact cited the case where a plant used waterborne inks on all but one printline. He felt carbon adsorption would be too costly for controlling a single line, and incineration therefore would be selected.

The second plant (IV-E-10) was no longer considering incineration. Incineration had been studied because the printlines were far apart, making duct and fan costs high enough to consider using two control devices rather than one. They felt that two incinerators would be less costly than two carbon adsorbers.

The third plant (IV-E-12) had firm plans to install an incinerator rather than a carbon adsorber because the plant is surrounded by close neighbors and does not have enough space for a carbon adsorber.

Addressing each of the commenter's four points; first, EPA feels that since new, modern equipment normally does not rely on oven temperatures as high as 300°F, it is unlikely that excessive plasticizers would be emitted in the drying oven. However, if such plasticizers were emitted in the printing and coating operation, bed fouling would be a potential problem and would require the provisions listed by the commenter such as more frequent bed cycling. Plasticizers are emitted in the embossing operation, and, since such embosser emissions are difficult to control, especially with carbon adsorption, embossers were not considered part of the affected facility for the purposes of this standard.

The commenter cited several technical problems associated with carbon adsorbers, including maintenance, risk of bed fires, risk of total shutdowns, carbon replacement, space requirements, and distillation. Problems associated with maintenance, bed fires, shutdowns, and carbon replacement can be minimized by careful operation as has been the case at existing facilities, such as the one described in the response to Comment 2.2.2, that have had long-term success with carbon adsorption and found that it is capable of consistently achieving 95 percent control efficiency.

The BID estimated that, at a typical plant, 3200 square feet would be necessary to accommodate a carbon adsorber, cooling tower, solvent distillation equipment, solvent drying equipment, and recovered solvent storage

tanks. Newly constructed facilities would have the opportunity to plan space to accommodate their selected control device. Some existing plants may not have the necessary space for a carbon adsorber. Applicability of reconstruction provisions is judged on a case-by-case basis by the Administrator based on economic or technical limitations. This case-by-case approach gives some additional leeway if space requirements appear to be a factor that would limit a source's ability to meet the standard.

Next the commenter addressed the cost and technical difficulty of distilling mixed solvents with close distillation temperatures. EPA acknowledges this difficulty and notes that some solvents may indeed be incompatible with carbon adsorption. However, during the development of the standard, it was determined that such solvent distillation problems would be rare. The types of solvents studied in the model plant analysis of carbon adsorption, where the solvents were distilled and reused as new solvent, make up over 95 percent of the solvent volume used in this industry.

The commenter's final issue addressed the potential inability of carbon adsorbers to achieve and maintain 95 percent efficiency in recovering a number of solvents at the estimated cost. The test program clearly demonstrated 95 percent efficiency on a carbon adsorber processing the types of solvents used in most cases in this industry. As mentioned above, these solvents make up over 95 percent of the solvent used in this industry. Based on the contacts with plants who are or have considered using incineration and on the commenter's discussion, the Administrator has concluded that there are certain site-specific and process-specific conditions where carbon adsorption would not be BDT. As described above, some of those site-specific conditions are when only a single print line is to be controlled, when print line configuration prohibits control by a single carbon adsorber, and when the available space is insufficient for a carbon adsorber. Some of the possible process-specific conditions are when high oven temperatures cause plasticizer emissions and when solvents with close distillation temperatures are used.

Based on these indications that carbon adsorption would not be BDT in some circumstances, EPA has added compliance provisions for incineration.

It has been adequately demonstrated that incineration can achieve a comparable control efficiency to that of carbon adsorption at a higher, yet reasonable cost. Thus, an owner of a facility facing various site-specific or process-specific problems that make carbon adsorption too costly or unable to meet the control needs of the process might choose to achieve compliance using incineration.

2.2.4 Comment: Two commenters (IV-D-6, IV-D-8), both representing producers of vinyl coated products and vinyl printed products, disagreed with EPA's treatment of the test data on capture efficiency. One commenter (IV-D-6) explained that during the second test which indicated a capture efficiency in excess of 90 percent, the room air supply fan was not operating and the wall exhaust fan was only operational during times that the print head fans were off. He stated that machines cannot be run with the room air supply fans off, and therefore he felt that the test was not valid or representative. The other commenter (IV-D-8) felt that the "turbulence" or "disruption of air distribution" cited in the BID due to operation of the room air supply fan and the wall exhaust fan were legitimate operating conditions, and he felt their effects should not be ignored in determining capture efficiency. He felt that EPA had "discarded all lower but real world" capture efficiency data. He urged EPA to discard the test data cited in the BID and conduct a new series of tests on a new printer. A trade association (IV-D-7)[1] concurred with these views. In addition, the trade association stated that the emission testing program was not conducted under normal operating conditions and referred to the General Provisions, 40 CFR 60.8(c), which require that performance tests be "based on representative performance of the affected facility." The association noted that techniques such as turning off the fans or total enclosure of the print line may be necessary during the performance test. The association, however, maintained that enclosure of a print line creates conditions which are not representative of the capture efficiency achieved at a print line under normal operating conditions. In other words, it is not clear that any new source in this industry could achieve 90 percent capture efficiency

during ordinary operations. The commenter elaborated that total print line enclosure is not practicable during operation, and the efficiency of air management around the print line depends on a number of factors over which the operator may not have control, even in the design of a new print line. For example, where a new print line is installed in a large building containing other processes, major capital expenditures could be required to achieve 90 percent capture efficiency during normal operation. Another commenter (IV-D-6) agreed that a total enclosure of the print line is not practical because of operator accessibility and the high concentrations of solvent encountered with the enclosures that in some places could exceed the lower explosive level (LEL). The trade association (IV-D-7)[1], therefore, concluded that EPA should conduct further capture efficiency tests for a new vinyl print line during normal operation. Another commenter (IV-D-10) stated that the emission test that verified 90 percent capture efficiency was conducted under contrived conditions, and therefore questioned the results and appropriateness of a 90 percent capture regulation.

Response: In order to respond to the comments on the performance tests and the representativeness of test conditions, it is important first to make clear that the performance test procedure is, in effect, an integral part of the standard. For this reason, the test procedures and test conditions used by EPA during the development of the standard must be the same as or have a known relationship to the test procedures which will be used and the performance test conditions which may be encountered during the testing of sources which are subject to this standard.

In this standard, the test procedures to be used by a plant operator for determining compliance will be the same as or equivalent to those used by EPA in developing the standard. The performance conditions may differ depending, for example, on the configuration of the plant and the number of lines. However, the EPA tests were, and subsequent performance tests will be, conducted in conformance with the same criteria, thereby assuring that the standard is achievable during any performance test.

In conducting a performance test, the plant owner must demonstrate that his new line can achieve the performance standard when tested under operating conditions which are representative of normal production and/or which reflect the air change conditions during the EPA test (as specified below). One important feature of the performance test is that all fugitive VOC emissions from the printing area must be captured and vented through stacks suitable for measurement. For a new line(s) in a new plant, emissions from the room in which the line(s) is (are) located can be measured with no special arrangements. For a new line in a plant with existing lines, the owner or operator may desire to isolate emissions associated with the new line from those associated with existing lines. In this case, he has three options:

(1) build a permanent enclosure around the affected facility;

(2) build a temporary enclosure around the affected facility (the enclosure has to be ventilated at a rate which approximates the rate to which the affected facility is exposed without the enclosure up to 20 air changes per hour); or

(3) shut down all other sources of VOC and continue to exhaust fugitive emissions from the affected facility through any building ventilation system and other room exhausts such as print line ovens and embossers.

The industry has argued that a total enclosure restricts operator access and would allow VOC concentrations to increase to unacceptable levels. It is the Agency's position that it is possible to construct a total enclosure which provides the necessary operator access while also preventing the buildup of high concentrations of solvent. The EPA test results show that an increase in solvent concentration is not the inevitable product of a total enclosure.

The two tests performed during the development of the standard were conducted at a new facility which had installed only the first of a total of three print lines within a building. Thus, the building itself served as a permanent total enclosure housing only one line.

The industry would disregard results of the test at this plant because it alleges that EPA "contrived" the operating conditions. Air management is a critical aspect of any pollution control system. EPA did indeed alter the old normal air management scheme within the building in an attempt to attain the best operating conditions for pollution control. As a consequence of what was learned, the plant adopted new normal operating conditions, the conditions under which the EPA tests were actually conducted.

During the first test, the room containing the printing line had two ventilation fans, one in the ceiling and one on the wall. Only the wall fan was operating prior to the first test. (The test data revealed its discharge was much less than design.) A large intake ventilation fan mounted directly above the operating line was turned on at EPA's request in an attempt to assure that the test took place under normal operating conditions. It was assumed that the ventilation fan would normally be operated when the plant ultimately had three lines. It was not until after the first test was complete that the owner explained that normal operation was usually with the overhead ventilation fan off. Because of the fan's location, it discharged directly on the print heads, causing premature drying of the inks on the gravure cylinders and adversely affecting the quality of much of the material printed during the test. The plant personnel subsequently had to turn the fan off in order to produce a product within specification. It was because EPA had inadvertently tested the plant under abnormal conditions that the decision was made to return for a second test.

The wall exhaust fan was not operated during the second test based on the Agency's judgment that the best air management for capture of VOC emissions from the plant required that the fan not operate. That judgment was based on the following reasoning. The fan was originally installed to ensure that the threshold limit value (TLV) would not be exceeded within the building. On the first day of the second test, however, air flow measurements revealed that although the fan motor was running, the fan was essentially operating at a zero discharge rate because of loose drive belts.

After EPA arranged to have the belts adjusted, the fan's operation caused turbulent drafts of air through and around the printing press.

Results of the second day's test showed that the drafts interfered with the print line's fugitive capture system. The data showed that significantly less VOC was captured than during the tests conducted the previous day when the belts were loose. The plant personnel and the test team jointly concluded that the fan's location (directly adjacent to and above the press) created drafts which adversely affected the capture system. Since the fan had previously been operating ineffectively (because of the maladjusted drive belts), there obviously was some question regarding the need for it. It was then decided to run the print line with the fan off to confirm that it was not critical to the operation of the line. If the VOC concentrations did not increase and exceed the TLV, the fan was unnecessary. The subsequent test confirmed that the exhaust systems associated with the press and embosser provided sufficient ventilation to keep the VOC concentrations below the TLV, and the wall exhaust fan was not needed during normal operation. Plant personnel concluded that the wall fan would subsequently be used only when the print line fans were off or in the event of some unusual occurrence, such as a solvent spill.

This mode of operation was advantageous for the plant because it increased the amount of solvent captured, thereby improving the return on the investment for the carbon adsorber. Obviously, this printing press could, did (because of the loose belts), and would continue to operate with ventilation provided only by the evacuation systems associated with the press and embosser exhaust systems. The results of monitoring conducted during the second test showed that with the wall exhaust fan off, the 11,700 SCFM evacuated from the vicinity of the printing press by the print head ovens and embosser ventilation system was sufficient to ensure that concentrations did not increase to unacceptable levels and that the 8-hour average concentration in working areas did not exceed the TLV. This draft would provide air changes approximately every 3 minutes to a room with dimensions of 20' x 20' x 90', more than adequate to house the print line, and coincidentally, about one-third the volume of the room which housed this

print line. This is consistent with good ventilation practice for a clean room as discussed in Industrial Ventilation - A Manual of Recommended Practices (Committee on Industrial Ventilation), 1976, p. 5-112.

Should the operator decide to conduct his performance test with the print line contained in a total enclosure, he has two options: to construct either a permanent enclosure or a temporary enclosure which would be removed upon completion of the performance test. The cost of a permanent enclosure would be relatively small, less than 2 percent of the total capital required for the new line (IV-B-9). A temporary enclosure would be even less expensive.

If an operator chooses to conduct the performance test with a temporary enclosure, the only constraint the Agency places on the test is that the plant operator must approximate the ventilation conditions expected to be in effect when the enclosure is removed or create conditions that would represent good ventilation practice as recognized by authoritative sources such as Industrial Ventilation. However, it is not necessary to ventilate the enclosed space at a rate greater than 20 air changes per hour. This rate is consistent with that of the test conducted by the Agency.

As an alternative to the total enclosure, a plant operator may elect to shut down other sources of VOC in the room which contains the affected facility. The fugitive emissions from the print line must continue to be exhausted through any area or building ventilation system and other room exhausts, such as print line ovens and embossers, that would operate under normal conditions.

At some plants, the work area may be ventilated only by the drafts of ovens and embossers. At other plants, high levels of fugitive emissions from existing facilities may require that separate ventilation fans be operated. In this latter situation, the operator should consider two of the advantages of reducing the amount of ventilation used for the existing facilities. First, the costs of circulating, pumping, heating, and conditioning large quantities of air through a plant can be significant. Secondly, poorly designed ventilation systems (as evidenced during testing of the reference plant) can interfere with the VOC capture system, increase

the fugitive emissions within the building, and perhaps thereby create a need for even more ventilation air.

If a new line is installed in the same room with existing lines, there are ways to design and install or alter building ventilation systems which would minimize its effect on the efficiency of the capture system of all lines, but especially the line subject to the NSPS. For example, if a building ventilation draft fan must be used, the intake can be manifolded with the suction inlets located around the work stations of the existing lines where the fugitive VOC concentrations could be expected to be highest. If a forced air fan is used, the ventilation air can be manifolded to a number of outlets located such that they do not compete with the solvent recovery system but may actually improve it. Such a thoughtfully designed dispersion system would likely permit operating with much smaller volumes of ventilation air.

Another improvement in air management techniques was developed by the plant that EPA tested when a second line was installed after the test program was completed. The duct work for a second new print line was constructed so that oven make-up air is collected from between the print heads by "floor sweeps" rather than above the print heads as was done by the first print line which EPA tested. This should further reduce fugitive emissions and improve overall capture efficiency. The cost of making the type of air management changes discussed above would likely not exceed 2 percent of the control cost for the new line. The potential savings to the owner in reduced utility costs and increased solvent recovery would offset some and perhaps all of the incremental control cost.

The final standard gives the plant operator a great deal of latitude in deciding how to demonstrate compliance. A new line could be constructed within a permanent enclosure, thereby simulating the conditions under which EPA conducted its tests. Alternatively, the line could be installed in a room with existing sources. If the ventilation system in the existing room is expected to affect the performance of the new line's capture system, the performance test may be conducted with the existing sources shut off or a temporary enclosure may be installed to isolate the new line from the

existing plant equipment. If a temporary enclosure is constructed, the building ventilation system (to which the new line will normally be subject) must be approximated, but only up to a maximum of 20 air changes an hour. This is consistent with conditions under which EPA tests were conducted and representative of good ventilation practices.

For the reasons previously discussed, it is the Administrator's judgment that the results from the second test show that high capture efficiency can be attained and worker exposure limited if a print line and its adjunct vapor capture and work space ventilation systems are properly designed. The adjustments made to the plant's air management system during testing were needed in order to best represent the plant's normal operating conditions, but more importantly, the adjustments were made to ensure that the test was conducted under conditions which were representative of the best demonstrated technology. Also, the capture efficiency data were obtained under conditions that could be normally and routinely maintained by properly designed new print lines and were representative of capture efficiency that could be achieved by any new print line even when installed in existing plants. Therefore, further capture efficiency tests were not conducted as requested.

2.2.5 Comment: The commenter (IV-D-7)[1] representing the trade association stated that, while his organization supports the percent reduction format of the proposed standard, they were concerned that because EPA had only assessed the environmental, energy, and economic impacts of carbon adsorption, the Agency may intend that carbon adsorption technology must be used for compliance. He felt that such requirement would be environmentally and economically unsound and, indeed, infeasible for some segments of the industry. He asked that EPA clarify that any combination of capture and control which achieves the required level of VOC reduction is acceptable.

Response: It is not the Agency's intent that carbon adsorption be the only technology available for compliance. Indeed, compliance provisions for waterborne inks were proposed with the standard in addition to provisions

for carbon adsorption. EPA has also added compliance procedures for incineration to the regulation.

As stated in the preamble (48 FR 2283), the 85 percent reduction requirement was based on a capture efficiency of 90 percent and a control device efficiency of 95 percent. However, any combination of capture efficiencies and control device efficiencies would be acceptable as long as the 85 percent reduction is achieved.

2.2.6 Comment: One commenter (IV-D-6) felt that the NSPS should include a provision for the use of waterborne and solventborne inks on the same piece of equipment. He noted that this way, when a product is run through this source, the total emission from this source would meet the required emissions limitation. He added that this method of compliance is allowed in the NSPS for publication rotogravure printing and that it should be incorporated into the flexible vinyl coating and printing NSPS.

Response: The standard does not prohibit the use of waterborne and solventborne inks on different units of the same print line. However, if the VOC-to-ink solids ratio exceeds 1.0 over the averaging period, emissions must be directed to a control device. Compliance with the publication rotogravure standard is determined based on a liquid material balance which is relatively simple to demonstrate because of the types of solvents prevalent in that industry. The average VOC emission percentage in that standard is calculated as: (total mass of VOC used minus total mass of VOC recovered) divided by (total mass of VOC used plus total mass of water used). The water used includes dilution water and water in waterborne inks. If a vinyl printer were able to demonstrate compliance using a liquid material balance approach, he could petition the Administrator under the General Provisions to conduct this type of performance test.

2.2.7 Comment: One commenter (IV-D-2), an ink manufacturer, stated that he was not familiar with EPA's definition of VOC. He pointed out that

different states use different definitions of VOC and he was therefore concerned with calculating the VOC content of his inks.

As a compliance alternative, the trade association representative (IV-D-7)[1] said that one member had expressed interest in using a combination of waterborne inks and coatings formulated with nonphotochemically reactive halogenated solvents as a means of compliance. He added that since this would appear acceptable based on EPA's definition of "VOC," he felt Agency consideration was desirable.

Response: EPA's letter acknowledging the receipt of the first commenter's letter (IV-C-1) explained that the definition of VOC appears in 40 CFR 60.2. This section explains that

> "'Volatile Organic Compound' means any organic compound which participates in atmospheric photochemical reactions; or which is measured by a reference method, an equivalent method, an alternative method, or which is determined by procedures specified under any subpart."

EPA has determined that the following organic chemicals do not participate in atmospheric photochemical reactions and are therefore excluded from the definition of VOC:

methane
ethane
1,1,1-trichloroethane (methyl chloroform)
methylene chloride
trichlorofluoromethane (CFC-11)
dichlorodifluoromethane (CFC-12)
chlorodifluoromethane (CFC-22)
trifluoromethane (CFC-23)
trichlorotrifluoroethane (CFC-113)
dichlorotetrafluoroethane (CFC-114)
chloropentafluoroethane (CFC-115)

This list of nonphotochemically reactive chemicals may be updated in the future. In a telephone call to the commenter (IV-E-20), EPA learned that at least one vinyl printer is using methylene chloride, tricholorotrifluoromethane, and 1,1,1-trichloroethane. Nonphotochemically reactive solvents should be excluded when determining the VOC content.

The procedures in Reference Method 24 determine total volatile organics in the ink and cannot distinguish between photochemically and nonphotochemically reactive compounds. The results from Reference Method 24 would have to be adjusted using standard gas chromatographic techniques to subtract any nonphotochemically reactive halogenated solvents that were in the ink.

2.2.8 Comment: One commenter (IV-D-10) asked why, if compliance testing required the average of three sets of data, did the standard not also require three tests?

Response: Based on the General Provisions [40 CFR 60.8(f)], the regulation requires that each performance test shall consist of three test runs. The test program used in developing the standard consisted of seven test runs, and capture efficiency was 90 percent or higher for all seven runs. There is no requirement that a specific number of tests be conducted in a testing program for standard setting.

2.3 MODIFICATION AND RECONSTRUCTION

2.3.1 Comment: One commenter (IV-D-8) recommended that physical changes for the purpose of energy conservation not be considered as a reconstruction of an existing source. He disagreed with EPA's assumption that extensive equipment modifications would not occur. He gave an example of oven replacement, explaining that as energy costs continue to rise, the likelihood of oven repair/replacements for energy conservation increases. Expenses for oven replacement could be over 50 percent of the installed cost of the affected facility, triggering the application of the NSPS. While such a project would conserve energy and reduce VOC emissions, the VOC reduction would be less than the 85 percent required. He added that application of the NSPS may cause a delay in such energy conservation projects "until energy costs rise even higher and the cost of additional VOC controls to achieve 85 percent emission reduction can be justified." The commenter strongly recommended that the costs for energy conservation be

excluded from reconstruction costs and recommended a change in the regulation to accomplish this.

Response: During the development of this regulation, EPA believed it was unlikely that existing facilities would become affected facilities under the provisions for modification and reconstruction. The preamble to the proposed regulation explained that extensive modifications and reconstructions were not expected to occur in this industry. The preamble explained that there were few changes constituting a reconstruction that could be made to the print line and that plant owners would be likely to chose to build an entirely new line since the cost of a new line would be comparable to the cost of retrofitting an existing line.

Section 111 requires that standards reflecting best demonstrated technology (BDT) apply to new sources, and these include reconstructed sources. To justify a categorical exemption from the standard for sources rebuilt for energy conservation purposes, EPA would have to conclude that there was no BDT for such sources. This is not the case. On the contrary, EPA judges that in general BDT for such sources is the same as for other new sources, and that they should therefore be subject to the same standard. In the course of installing new ovens, the facility owner would have an excellent opportunity to improve the capture efficiency and thus raise the overall control efficiency. In particular, EPA considered the commenter's suggestion that application of the NSPS to such sources would delay their rebuilding. The decision to undertake an energy conservation project is an economic decision made when the costs of not implementing the project (higher energy costs) exceed the costs of implementing the project (retrofit plus controls). The purpose of the reconstruction provisions is to ensure that an owner or operator does not rebuild an existing facility without consideration of the achievability of the standard. Without such provisions, circumvention of the standard could be attempted by replacing all but minor components. Reconstruction costs are highly site-specific. However, if there are cases where the cost of compliance for a rebuilt source is unusually high, that is considered on a case-by-case basis by the

Administrator in determining whether the rebuilding constitutes reconstruction subject to NSPS, under 40 CFR §60.15(b)(2).

2.4 ECONOMIC IMPACT

2.4.1 Comment: A representative of a trade association for wallcovering manufacturers (IV-D-9) stated that, as proposed, the NSPS would impose a serious financial burden on an industry which is substantially depressed as a result of economic conditions. He added that unless there is a stronger showing that the proposed NSPS is the only way to enhance environmental quality significantly , the wallcovering industry should instead be given the flexibility to investigate and implement a variety of new technologies, such as waterborne inks, which may provide long-term control of undesirable emissions at a much lower cost.

Response: The economic analysis of the proposed standard indicates that the costs and economic impacts are reasonable. As proposed, the standard contained compliance provisions for waterborne inks as well as for carbon adsorption. Also, compliance provisions for incineration have been added to the promulgated standard. With or without an NSPS, the industry always has the flexibility to investigate and implement new technologies. Indeed, the Agency supports and encourages the development and use of new innovative technologies that provide for the control of air emissions.

2.4.2 Comment: Several commenters (IV-D-7[1], IV-D-8, IV-D-10) pointed out what they felt to be inadequacies in EPA's economic analysis. The trade association representative (IV-D-7)[1] stated that the costs and benefits of the NSPS are not accurately reflected in EPA's analysis of environmental, energy, and economic impacts. He discussed four Agency assumptions he felt were questionable to support this statement. Other commenters (IV-D-8, IV-D-10) also mentioned some of these assumptions. The four assumptions in question are:

2.4.2.1 Comparison between costs of compliance with the NSPS and SIPs. The percent reduction required under the proposed NSPS is not directly comparable to SIP requirements because the SIPs generally do not take fugitive emissions into account, as does the proposed standard. Thus, the commenter (IV-D-7)[1] noted that the percent reduction requirement in the NSPS is considerably more stringent than a percent reduction computed from SIP emission limits. He went on to say that it should not be assumed that all affected facilities would achieve the SIP level of control through the use of add-on control technology. In some cases plants would achieve SIP compliance through the use of waterborne inks and process modifications.

He concluded that the potential economic impact of the NSPS was substantially understated because of the overly simplistic comparison of compliance costs for the NSPS with compliance costs of current applicable requirements. Therefore, the commenter urged EPA to determine actual and projected costs of compliance with SIP regulations and compare those with the costs of compliance with the NSPS.

Response: The BID states that current State regulations do not cover the fugitive VOC losses from vinyl coating and printing operations. This statement was not intended to imply that State regulations necessarily exempt fugitive emissions. The statement meant that it may be possible to meet the 65 percent overall VOC reduction listed in the CTG by controlling dryer emissions only.

EPA did not assume that all affected facilities would achieve the SIP level of control through the use of add-on control technology. Add-on control technology, specifically carbon adsorption, was used in the SIP/NSPS incremental cost analysis because it was the only control technology in use during the development of the standard. There are two important points with regard to the incremental differences between the SIP and NSPS levels of control. First, regardless of how a facility met the SIP control level, some costs would be involved whether they were for development of waterborne inks, process modifications, or installation of carbon adsorption equipment. Since carbon adsorption was the only technology in use, those costs were the

most appropriate for analysis. Second, during development of the standard, there was no indication that any facilities would become subject to the standard as a result of modification and reconstruction and, hence, that no facilities would actually be faced with increasing control from the SIP level to the NSPS level. Although two commenters (IV-D-7[1] and IV-D-8) have indicated that reconstruction or modification might be considered, it would still be unusual for a plant to be faced with having to increase control from the SIP level to the NSPS level. Instead, prior to construction of a new facility, the owners would decide how best to meet the required level of control.

The estimated costs of compliance compiled during the development of the standard are reasonable and realistically reflect the costs of compliance with SIP regulations based on carbon adsorption. Since EPA does not know exactly how plants will choose to meet SIP requirements, the Agency cannot make the actual comparison requested by the commenter.

2.4.2.2 Cost and the applicability of carbon adsorption to all segments of the vinyl industry. The commenter (IV-D-7)[1] noted that EPA's estimate of $1.2 million for a carbon adsorption system was low by several hundred thousand dollars. He added that the potential savings from recovered solvent do not offset the initial capital cost of the carbon adsorption system.

The commenter said that carbon adsorption is not feasible in all segments of the vinyl industry and that it is not economical or practicable in a declining industry to invest large amounts of capital required for carbon adsorption systems.

The technical problems that the commenter associated with the applicability of carbon adsorbers are discussed in Section 2.2. Briefly, he noted the costs of reduced carbon bed life and special adsorption techniques, the cost of distilling mixed solvents with close distillation temperatures, and higher operating costs resulting from maintaining 95 percent efficiency in recovering emissions of a number of solvents used in the industry.

The commenter concluded his remarks on carbon adsorption by saying that other methods of emission control, particularly incineration, may be the only feasible technology in certain segments of the industry but may cost more than carbon adsorption.

Response: EPA agrees with the commenter that other methods of emission control, such as incineration, may be desirable in certain segments of the industry. (This is explained in the response to Comment 2.2.3.) If incineration were used to meet the standard, EPA estimates (IV-B-8) indicate that the costs would be higher ($600 per ton VOC reduction) than carbon adsorption ($75 per ton VOC reduction), yet still reasonable. Compliance provisions for incineration have been added to the regulation.

EPA's cost estimates for carbon adsorption equipment were based on industry cost data for installed control systems as explained in Chapter 8 of the BID. In regard to the comment that the cost estimate for the carbon adsorber was low by several hundred thousand dollars, EPA notes that for a system estimated to cost $1.2 million, this difference is low enough that the costs are considered comparable.

Potential savings from recovered solvent offset annual operating costs, but do not offset the initial capital costs. EPA estimates show, however, that even if solvent was recovered, but no value was assigned to it, the cost effectiveness of carbon adsorption would be about $800 per ton VOC reduction. EPA considers the costs of even this "worst case" situation to be reasonable.

The technical issues mentioned by the commenter are addressed in the response to Comment 2.2.3. The Agency feels that, with the addition of compliance provisions for incineration, the operator of a new facility will have the option to select the most practical and cost effective means of control for his print line.

2.4.2.3 Accuracy of estimated costs and benefits of the proposed standard. In regard to the estimated model plant cost factors, the commenter (IV-D-7)[1] noted that the cost of electrical consumption attributable to the control

equipment at the plant tested was about $20,000 annually. He also added that model plant costs such as operator costs, utility costs, and interest rates did not reflect current costs in the industry. He explained that use of company- or division-wide financial statements, from which profit allocable to vinyl coating and printing operations cannot be discerned, may have led to overstated profits for this segment.

A second commenter (IV-D-8) agreed that costs were understated throughout the BID with respect to labor, capital, and energy. Specifically, the commenter cited the credit for recovered solvent. He noted that the material recovered from a carbon adsorber would require processing to remove water and separate solvents. He felt that it was unlikely that operators would be able to justify the cost of installing and operating distillation equipment because of the relatively small volumes of solvent which may be recovered. He said it was more likely that the printer would pay a fee to have this done. He concluded that the BID should determine actual costs for the various model plants.

Response: The commenters addressed several model plant cost factors they considered to be low. The assumptions and references for these costs were presented in Chapter 8 of the BID which states a probable accuracy of ±30 percent. Electrical consumption for Model Plant C for the NSPS level of control was estimated at $14,000 which is within the lower bounds of this level of accuracy and based on a nationwide average of utility costs. Costs were current when the BID was prepared. The response to Comment 2.4.5 discusses the sensitivity of the analysis to labor (operator) costs.

The use of company- or division-wide financial statements was necessary because most companies are reluctant to submit detailed financial information for the segment of interest, due to the proprietary nature of this information and other considerations. Consequently, it was necessary to rely upon publicly available financial data which possessed a greater degree of aggregation than would have been ideal. This commenter offered no additional information for the analysis. The important point is that such

aggregated data could just as easily understate the financial parameters of the segment of interest as it could overstate them.

As a result of this comment, EPA analyzed (IV-B-4) the economic impacts associated with paying a fee for solvent recovery rather than installing and operating distillation equipment. In this analysis, the estimated cost of the distillation system was subtracted from the capital costs. This was assumed to be 50 percent of the total capital costs. The estimated cost of having a jobber reclaim the solvent was added based on a fee of 70 percent of the full solvent recovery credit. For a typical model plant, the maximum percentage price increase would be less than 2 percent under this scenario. The Administrator considers this maximum percentage price increase reasonable.

2.4.2.4 Declining economic condition of domestic producers of vinyl materials and the markets. The commenter (IV-D-7)[1] felt that the declining market condition had not been taken into account, noting that for the past 5 years, the U.S. coated fabrics industry has suffered declining production, sales, profitability, and employment while competition in certain market areas from imports has increased substantially. The commenter urged that existing industry condition and prospects for future growth, especially in the northeastern and midwestern regions of the U.S., be considered more carefully.

Response: Declining market conditions were taken into account in the BID. In fact, because growth within the flexible vinyl coating and printing industry has been uneven, the industry was divided into three subgroups for analysis: supported vinyl materials, unsupported vinyl film, and wall coverings. An NSPS applies to new sources and not to existing sources unless they are considerably modified or reconstructed. As the BID points out in Section 9.1.4 (page 9-21), no new sources are anticipated in the supported and unsupported film segments primarily due to the declining market conditions as noted in Section 9.1.3.1 (page 9-10). Wall coverings, on the other hand, have experienced considerable growth in the past and

three to six new sources are forecast. The response to Comment 2.1.1 discusses anticipated growth of the industry. Because the incremental costs of compliance are minimal and, in some cases, there are actually savings which arise from a solvent recovery credit, future growth will not be hindered by the NSPS.

There are several reasons why the current, short-term state of the economy should not control NSPS standard setting activity. An NSPS takes three to four years to develop and considers long-term air quality improvements from growth and also allows for the planning of the growth to be accomplished by making specific air pollution control requirements. Recessionary conditions can improve rapidly in an industry over the four-year period that it takes before the next review of an NSPS is conducted by EPA. In addition, there are some industries where the advent of new technology (hence new sources) will occur even during recessionary times. This depends upon the economics of the new technology in comparison to the replaced technologies; i.e., it is generally less expensive to install control systems in new plants than to retrofit them to existing plants.

2.4.3 Comment: Two commenters (IV-D-6, IV-D-10) felt that the proposed NSPS does not adequately address incineration as a control alternative. One of those commenters (IV-D-10) stated that the economic analysis was based upon fixed-bed carbon adsorption systems with no consideration for use of an incinerator. Full credit was taken for recovered solvent. Recent indications are that when a full analysis of the operational requirements is completed, an incinerator may be the control device of choice. Under these circumstances, he concluded, an analysis of incinerator costs for vinyl coated fabric, other than wall coverings, should be completed. Another commenter (IV-D-7)[1] suggested that the economic analysis for this proposal address the costs and energy and environmental impacts associated with incineration, inert air condensation, and other systems. That commenter (IV-D-7)[1] felt that the use of incineration may make compliance with the NSPS considerably more costly than projected on the basis of the cost analysis of carbon adsorption.

Response: During the development of this standard, carbon adsorption was the only control device in use in this industry and, thus, the analysis for development of the NSPS was based on carbon adsorption. Incineration was described in the BID and was mentioned as a possible control technique although it was not in use at the time. (The response to Comment 2.2.3 explains the current status of incineration in this industry.)

The commenter is correct that the economic analysis was based on fixed-bed carbon adsorption systems and that full credit was taken for recovered solvent. Because most manufacturers who have installed solvent recovery equipment are reusing the recovered solvent as if it were new solvent, control device equipment costs were estimated for equipment that was capable of purifying the recovered solvent so that it could be reused.

EPA developed estimates (IV-B-8) of capital and annualized costs and cost effectiveness for thermal incineration. Thermal incineration was selected for the analysis rather than catalytic because that is the type under consideration by the three plants contacted and because, since thermal incineration is more costly than catalytic, the test for reasonableness would be based on the "worst case." At a typical plant, Model Plant C described in the BID, the results of the analysis showed an annualized operating cost for control using thermal incineration of $358,000 and a total capital investment of $669,000. The cost effectiveness of control using incineration was determined to be approximately $600/ton VOC reduction. Although this is higher than the cost of carbon adsorption ($75/ton VOC reduction), the Administrator considers this a reasonable cost and, therefore, compliance provisions for thermal and catalytic incineration have been added to the standard.

Energy demands of an incineration control system are greater than for carbon adsorption. At a typical plant such as Model Plant C in the BID, energy demand would be about $42 \times 10^9$ Btu per year greater for incineration than for carbon adsorption. In terms of environmental impacts, both systems can reduce VOC emissions by the required 85 percent. Wastewater and spent carbon are not generated when incineration is used.

No applications of the use of inert air condensation in this industry were found and it is not expected to be used. However, should this technology develop prior to the review of this standard, the owner of the affected facility has the option of using this control technology if it will meet the standard.

2.4.4 Comment: One commenter (IV-D-10) stated that the basis for annualized costs included data from a 1978 Agency publication. He felt that cost data that are at least five years old do not seem to reflect current conditions or provide a strong base for current economic projections.

Response: The basis for some of the annualized costs presented in Chapter 8 of the BID did include data from a 1978 EPA publication ("Capital and Operating Costs of Selected Air Pollution Control Systems," EPA-450/5-80-002). Specifically, these costs were operating labor, maintenance, and indirect operating costs including overhead, taxes and insurance, and administration.

As a result of this comment and Comment 2.4.2.3, the Agency examined the sensitivity of the analysis to these estimates. Even if the wage rate of $10.00 per hour were doubled, the amounts involved are not significant (less than 1 percent of capital costs). Furthermore, the overhead rate of 80 percent of labor may, in fact, be high since some overhead charges such as taxes, insurance, and administration are included separately.

2.4.5 Comment: One commenter (IV-D-10) stated that he felt the costs associated with the wastewater from a carbon adsorption system had not been fully investigated and were understated. His plant's solvent systems contain mixtures of acetates, ketones, and alcohols. He stated that the water distillate from multiple solvent distillation units may be 10 percent organic azeotrope and that the biochemical oxygen demand (BOD) could be about 114,740 mg/l. He noted that, with publicly owned treatment works (POTWs) developing user charges for wastewater with over 100,000 mg/l BOD, vinyl coaters and printers would be faced with such a surcharge. He

concluded that this issue needed to be addressed and the appropriate changes made in the economic analysis. A second commenter (IV-D-5) resubmitted earlier comments (II-D-100) that also requested that EPA consider the cost of pretreatment for residual solvent prior to discharge to a POTW.

Response: Dissolved solvent in the condensate from the carbon adsorber represents a potential water pollution problem. Although the majority of the solvent is removed during distillation and in the second condensation step, varying amounts could remain in the wastewater depending on the type of solvent. When the BID was written, no local POTWs were imposing surcharges on vinyl printers with carbon adsorption distillation systems.

This issue was raised previously (II-D-100) and, as previously stated (II-C-86), if a municipality should require an owner to pretreat, the proper cost attributable to the NSPS would be for the incremental amount of water treatment required due to the NSPS beyond that of the CTG (i.e., State regulations). This incremental cost will not be a major cost item because, from a typical plant, this incremental difference in the amount of wastewater generated would be about 780,000 gallons per year. Although the Agency feels it is unlikely, should the cost of a possible POTW surcharge cause the owner or operator of a new facility to conclude that carbon adsorption would be too costly, he can now choose incineration as a means of control.

## 2.5 SELECTION OF BEST DEMONSTRATED TECHNOLOGY

2.5.1 Comment: The trade association commenter (IV-D-7)[1] stated that the technology required to achieve the standard had not been demonstrated for most segments of the industry for the following reasons: (1) the emission testing program was not conducted under normal operating conditions and (2) the test data on residential wallcovering production did not adequately demonstrate that the control technology was applicable to the industry as a whole.

In regard to the applicability of the test data to the industry as a whole, the commenter questioned whether data and technology applicable to a

residential wallcovering facility are transferable to or characteristic of other parts of the industry such as automotive trim, upholstery, and apparel. He cited several variables including solvents, raw materials, line speed, web widths, and coating applications which change depending on end-use of the product, stating that it is inadequate to use tests from one facility using one process to print one type of product as representative of the entire industry. Another commenter (IV-D-6) added that air management and testing of lines wider than 30 inches has not been demonstrated. He noted that the BID states that 30 inches would be a typical width for a new source but that the typical width for his lines is 57 to 60 inches. The trade association representative (IV-D-7)[1] noted that solvents used to produce some products such as apparel are incompatible with carbon adsorption. He explained that incineration is probably the most flexible control option where process parameters are variable. Such variability would be desirable to enable a print line to produce different types of products. He listed three trade association members that use or plan to use incineration. The commenter felt that further study by EPA would be necessary to establish standards that reflect emission reductions achievable through application of the best technological system demonstrated for the different categories of sources in the industry.

Response: The discussion of EPA's emission testing program is included in the response to Comment 2.2.4. The applicability of test data to other segments of the industry has been discussed in the response to Comment 2.1.3.

In regard to the applicability of carbon adsorption to the industry as a whole, EPA recognizes that there may be some technological limitations to carbon adsorption. Therefore, the Agency contacted the three plants this commenter listed as having incinerators in use or being installed (IV-E-10, 11, 12). Only one of these plants has firm plans to install an incinerator. Based on these contacts and on comments outlining potential technical advantages, EPA has included compliance provisions for incineration. It appears that there may be potential situations where carbon adsorption could

not be used or would not be the control device of choice, and, in these cases, incineration can be used. Incineration control efficiencies of 98 percent have been demonstrated (IV-B-8). Since incinerators can achieve higher control efficiencies than carbon adsorbers, incinerators should be able to meet the standard. For those cases in which incineration would be the preferred control method, the standard includes compliance provisions for incineration.

2.6 SELECTION OF FORMAT

2.6.1 Comment: The trade association representative (IV-D-7)[1] suggested that EPA establish equipment design or engineering specifications as an alternative to demonstrating compliance with the percent reduction requirements. This would allow a new facility to be designed with the assurance that it would achieve compliance before a capital outlay. Such a format would reduce testing and monitoring costs substantially. The commenter added that such a provision would be compatible with the proposed NSPS for rubber tire manufacturing.

Response: Section 111(h)(1) and (2) of the Clean Air Act allows the Administrator to promulgate a design, equipment, work practice, or operational standard rather than a standard of performance only when a pollutant or pollutants cannot be emitted through a conveyance designed and constructed to emit or capture that pollutant; when a requirement for such a conveyance would be inconsistent with any Federal, State or local law; or when the application of measurement methodology to a particular class of sources is not practicable due to technological or economic limitations.

In the proposed NSPS for the rubber tire manufacturing industry (January 20, 1983, 48 FR 2676), an alternative compliance method was proposed that was applicable to three of the nine operations covered by the standard. The main compliance provisions were based on a percent reduction of the maximum allowable mass of VOC emissions per unit of production. The alternative compliance method let the owner or operator elect to meet equipment specifications for capture systems used in conjunction with a

95 percent efficient control device. For the vinyl and urethane printing standard, however, EPA does not believe that equipment specifications give reasonable assurance of compliance with the performance standard.

Since test data are available and there are no technical or economic limitations involved, the Administrator has promulgated a performance standard for the vinyl printing industry as required by Section 111(h)(1) and (2).

## 2.7 SELECTION OF EMISSION LIMITS

2.7.1 Comment: One commenter (IV-D-5) felt that the proposed 85 percent VOC reduction requirement could not be achieved by all affected facilities on a continuous basis. The commenter said that carbon adsorption system manufacturers have guaranteed 95 percent efficiency only under optimum process and recovery conditions. The commenter thought it unlikely that a company's management would risk a one million dollar or greater expenditure for an expansion or reconstruction with no certainty it could meet the 85 percent reduction requirement. He felt that the 85 percent reduction requirement would halt the limited growth projected for the industry. The commenter had also noted in comments he resubmitted (II-D-100) on an earlier draft of the standard that the 85 percent overall VOC reduction may not be reproducible or attainable for new installations in existing facilities. He based this opinion on the statements that air requirements of other presses and processes may prevent the use of the building as a "total enclosure," the varying load to the emission control device from multiple printing lines will reduce efficiency, and the carbon bed may lose efficiency under full-time use faster than anticipated in the BID. The commenter concluded in both letters that, since the 85 percent reduction would not be achievable by all affected facilities, Regulatory Alternative II, the 75 percent reduction requirement, should be adopted.

Response: The 95 percent carbon adsorber efficiency was based on test data showing efficiencies in excess of 98 percent, technology transfer from other industries such as publication rotogravure printing and pressure

sensitive tapes and labels showing carbon adsorber efficiencies of 95 percent, and on the manufacturer's guarantee of 95 percent efficiency of the carbon adsorber tested. As explained in the response to Comment 2.2.2, one plant confirmed the ability of its carbon adsorber to achieve 95 percent control after 30 years of operation. For these reasons, EPA feels confident that 95 percent control efficiency can be achieved consistently throughout this industry.

The commenter favored the 75 percent reduction alternative, stating that a requirement for 85 percent emission reduction would halt industry growth. The Administrator finds no reason, nor did the commenter offer data, to support the idea that a 75 percent reduction requirement would have any different effect on industry growth than would an 85 percent reduction requirement. Total annualized cost is less under 85 percent control due to the greater amount of recovered solvent. Capital cost of control at a typical plant is less than 10 percent greater at the 85 percent control level, and the economic analysis presented in Chapter 9 of the BID did not indicate any significant impacts on the industry.

EPA has not changed its evaluation of the facts since its response (II-C-86) to the commenter's earlier letter (II-D-100). The response to Comment 2.2.4 discusses enclosure of the print line during testing. The regulation provides for making specific alterations during compliance testing. The following two paragraphs are from the previous response (II-C-86) to these issues.

Varying load to the control device from multiple sources

For the purposes of determining compliance with a new source performance standard, a performance test is to be conducted on each affected facility and that is defined as a single print line. According to the General Provisions [40 CFR 60.8(c)], performance tests must be conducted under conditions that are representative of performance of the affected facility. Since each line is tested independently under representative operating conditions, the effect of "varying loads from multiple lines" is never a subject of issue. If operating conditions change substantially

after a performance test, another performance test must be conducted under the new representative conditions.

Loss of carbon bed efficiency

At the National Air Pollution Control Techniques Advisory Committee meeting (II-B-50) on September 22, 1981, an industry representative described a carbon adsorber that had been operating at one of this company's plants for over 30 years. He noted that a recent analysis of system efficiency showed that 95 percent control was obtained. Carbon life for this adsorber is about 3 years, the same as was used in our cost estimates.

For these reasons, the Administrator maintains that the 85 percent reduction requirement can be met by all affected facilities.

2.7.2 Comment: The trade association representative (IV-D-7)[1] supported the concept exempting waterborne inks from the emission standard, but stated that the proposed standard was not sufficiently flexible in that area. As an example, he noted that the proposed NSPS does not provide for the use of waterborne and solventborne inks on the same line. The association believes that changing the ratio of VOC to ink solids and the averaging period used in determining the VOC content of the ink would provide the desired flexibility. Specifically, they recommended that the cutoff point for waterborne inks be raised to 2.3 kg VOC per kg ink solids to enable a plant to use solventborne inks (e.g., 8.0 kg VOC per kg ink solids) for a longer time period. The commenter felt this would increase the development and use of waterborne inks.

The commenter felt that the proposed 30-day averaging period is too short and that a longer averaging period would not affect total potential allowable emissions.

Response: In a telephone call to clarify this comment (IV-E-16), the commenter explained that the proposed standard did not allow for the use of solventborne inks and waterborne inks at different print heads on the same print line at the same time. He noted in that telephone conversation that provisions for use of both types of inks at the same time are included in

the publication rotogravure NSPS. The response to Comment 2.2.6 explains EPA's position on this issue.

The commenter recommended increasing the ratio of VOC to ink solids used to define "waterborne inks." As the preamble to the proposed regulation explains, industry information has shown that the waterborne inks under development contain less than 1 kg VOC per kg ink solids, the level proposed below which the percent reduction standard would not apply. Increasing this cutoff to 2.3 kg as requested would not represent best demonstrated technology since such a change would allow an increase in emissions that could be avoided at a reasonable cost. It is unlikely that there are any waterborne inks in the 1.0 to 2.3 kg range. EPA does not agree that raising this cutoff would encourage the development and use of waterborne inks.

EPA examined alternatives (II-B-49) to the 30-day averaging period and concluded that the 30-day averaging period was sufficient to allow some use of high solvent inks and to encourage the development and use of waterborne inks. In response to Comment 2.10.1, however, the averaging period was increased to a maximum of 35 consecutive calendar days to add flexibility in accounting procedures.

The concept of an averaging period allows a facility that uses predominantly waterborne inks to use inks with a higher VOC content occasionally without installing an emission control system. The question of which averaging period to choose for waterborne inks is a question of whether the limit of 1.0 kg VOC per kg ink solids can be exceeded for some period of time. This period can be visualized as a peak level during the averaging period. While lengthening the averaging period would not affect total emissions, it would allow longer concentrated peak periods. These peak periods possibly would cause local odor and smog problems depending on local climatic conditions. In addition to such problems, lengthening the averaging period would make enforcement more difficult. Thus, EPA has not extended the averaging period as requested.

## 2.8 LEGAL CONSIDERATIONS

2.8.1 Comment: The trade association representative (IV-D-7)[1] commented that EPA should consider incorporating a provision that would permit over-control of existing facilities controlled by the same control device as a new source in lieu of achieving the percent reduction required by the proposed standard. He noted that such a compliance option would achieve the same degree of emissions reduction as enforcing the SIP requirements for the existing sources and the NSPS for the new sources, while providing needed flexibility. He cited the rotogravure printing NSPS [40 CFR § 60.433(e)] as having such a compliance option.

Response: The suggestion presented by the commenter would involve obtaining emission reduction credits from an existing facility to offset the amount by which the new facility exceeds the level attainable with BDT. This is not appropriate for several reasons. First, this is inconsistent with the primary purpose of Section 111, which is to reduce emissions to a minimum through the use of BDT. In addition, this alternative creates a number of enforcement uncertainties, one of which is the question of what would happen if the new facility has a longer life than the facility from which the emission reduction credits were obtained. Moreover, implementation of such an approach would require (1) precise pre-construction information on expected actual emission rates and (2) assumptions about the future relative inputs of the multiple units to the common control device. In the first instance, although it is presumed that the facilities in question would be meeting State standards, inherent variability in performance of the existing control device would make it difficult to pick a baseline emission level against which to measure improvement. This variability would make it very difficult to differentiate between actual emission reductions and calculated reductions that may or may not actually occur. In the second instance, where several different types of equipment were ducted in common, it would be difficult not only to apportion emissions among them as a base for determining reduction but also to assess the long-term constancy of that apportionment once it is made.

The publication rotogravure printing NSPS does not allow overcontrol of one existing facility in lieu of achieving BDT at a new, affected facility. Rather, it has provisions for showing compliance of the affected facility by testing the combined affected and existing facilities controlled by the same solvent recovery systems. The need for this compliance provision results from the use of a single control device for more than one facility and the inseparable comingling of solvent input and recycle streams. This precludes single facility mass balances. An operator choosing this compliance option would be required to show that the control achieved by all facilities, affected and existing, is equal to or better than the BDT level of control required by the NSPS. In the Agency's judgment, this assures that the affected facilities will achieve the degree of control reflecting the application of BDT. The rotogravure standard is based on a liquid material balance calculated over a 30-day performance test period. Neither the material balance nor the 30-day test period is appropriate for the vinyl and urethane industry.

For the reasons stated above, such alternative compliance provisions as suggested by the commenter will not be incorporated into the regulation.

2.8.2 Comment: The trade association representative (IV-D-7)[1] recommended that EPA reconsider the proposed standard because it does not comply with Executive Order 12291. The NSPS fails to comply, he said, because the environmental benefits are negligible, the costs of compliance are substantial, and stringent control of negligible emissions from new sources (if any) in this industry is not a regulatory objective which will "maximize the net benefits to society."

Response: Executive Order 12291 requires a Regulatory Impacts Analysis for "major rules" and requires that all agencies adhere to the following general requirements:

(a) base administrative decisions on adequate information concerning the need for and consequences of the proposed action;

(b) take regulatory action only when potential benefits outweigh potential costs to society;

(c) choose regulatory objectives that maximize net benefits to society;

(d) choose the regulatory alternative involving the least net cost to society; and

(e) set regulatory priorities that maximize the aggregate net benefits to society, taking into account the condition of the particular industries affected by the regulations, the condition of the nation's economy, and other regulatory actions contemplated in the future.

The preamble to the proposed regulation (48 FR 2287, col. 3) explained that this regulation is not a major rule because it would not result in any of the adverse economic effects described in Section 1 of the Executive Order. Thus, no Regulatory Impacts Analysis is warranted.

The general requirements of the Order are somewhat more subjective than the criteria for defining a "major rule." However, the Administrator feels that the careful analysis of environmental, economic, and energy impacts presented in the BID and discussed in the preamble indeed verify that the general requirements of the Executive Order have been met. As explained in the preamble, this regulation was submitted to the Office of Management and Budget (OMB) as required by the Order and was proposed after OMB review and approval. Finally, the requirements of the Executive Order do not override the requirements of Section 111 of the Clean Air Act. As discussed under Comment 2.1.1, Section 111 requires the promulgation of this NSPS.

## 2.9 TEST METHODS AND MONITORING

2.9.1 Comment: The trade association representative (IV-D-7)[1] suggested EPA amend the testing provisions to make them parallel to those for rotogravure printing (40 CFR § 60.433). He felt that such procedures would allow plants to prove compliance in a variety of ways and minimize the need to shut down one facility or to build temporary structures for testing. Such procedures might result in cost savings.

Response: The response to Comment 2.8.1 explains why obtaining emission credits from an existing facility to offset control requirements at an affected facility is unacceptable. The response also explains that in the rotogravure printing NSPS both existing and affected facilities would achieve control equal to or greater than the NSPS requirement.

The General Provisions (40 CFR 60.8) give the owner or operator the authority to use an alternative performance test method if it can be demonstrated to the Administrator to be adequate for indicating compliance.

2.9.2 Comment: Two commenters (IV-D-2, IV-D-5) addressed compliance provisions for facilities using waterborne inks. One commenter (IV-D-2), an ink manufacturer, felt that calculating the VOC content of their inks would be meaningless, add to overhead, and thus decrease profits because they have thousands of formulations and because they change formulations to meet customers' specifications. He agreed with the need to measure or calculate VOC content in the inks and suggested that ink manufacturers be allowed to submit general type formulations for families of inks and use approximate figures (plus or minus a certain percent) for VOC content. The second commenter (IV-D-5) felt that it was physically and economically infeasible for a facility using inks with an average VOC content of less than 1 kg VOC per kg ink solids to demonstrate compliance by determining and recording the VOC content of each ink used at the print head. He had explained this in previous comments dated October 20, 1981 (II-D-100) and resubmitted those comments with this letter. He pointed out that the inks applied are a blend of recycled excess inks, solvent, water, and new inks. Due to recycling and addition of water and solvent, the commenter felt that ink manufacturer's data would be of little use to his company. He added that it would also be practically impossible to use Reference Method 24 for the large number of inks his company would apply per day. This would be 250 to 350 tests in one day for each of two plants.

The commenter suggested what he considered a more reasonable and more accurate compliance system where the average VOC content of the inks applied would be determined through the use of ink manufacturer's formulations,

inventory and purchase records for new inks and diluents, the acceptance of recycled inks as being previously accounted for as new ink and diluent, and the measure of VOC content of discarded inks. This system was expressed by the following equation:

$$\underset{\text{VOC}}{\text{Emission}} = \underset{\text{VOC}}{\text{Ink}} + \underset{\text{VOC}}{\text{Solvent}} - \underset{\text{VOC}}{\text{Discard}} - \underset{\text{VOC}}{\text{Blending and Storage}}$$

VOC diluent added at the press would be accounted for in the solvent inventory and purchase records. The commenter noted that a small amount of VOC would be lost from storage and blending of recycled inks, but that this loss would be of little significance to the compliance determination as the evaporation rate of the low VOC content inks would be slight and the resulting error would inflate the calculated VOC-to-solids ratio. He felt that this limited number of samples could be analyzed in outside laboratories and eliminate the creation of a need for analytical laboratories in printing facilities. He also pointed out that short-term use of solvent-based inks on primarily waterborne facilities would be accountable because the two systems are incompatible and will be easily differentiated in purchasing, inventory, and manufacturing records.

The commenter concluded by requesting that the requirement in §60.583(c) (Test methods and procedures) to determine the VOC content of each ink as applied be deleted because it is not attainable for all facilities. He urged that the use of the weighted average be modified to provide credit for unused excess inks for determination of compliance. The commenter felt that the unreasonable cost of determining the VOC content of each waterborne ink, as applied, to comply with the proposed standard would discourage further development of waterborne inks.

Response: EPA agrees that in some cases the use of ink manufacturer's formulation data in combination with inventory or purchase records for new inks and dilution solvent might be appropriate in determining the weighted average VOC content of waterborne inks. Therefore, points to be covered in petitioning the Administrator to use such a method have been added to the regulation. Under such a method, the operator would account for the VOC and

solids content of new inks and dilution solvent directed to the print line during the averaging period. Credit would be given for VOC in discarded ink. Credit would also be given for inks at the end of the averaging period that are to be recycled but are not yet recycled. Credit for these recycled inks is not to be taken again during the next averaging period. As the commenter stated, however, no credit can be given for VOC lost during blending and storage of recycled inks since this quantity cannot be easily measured. This quantity would be of little significance in the compliance determination.

The ink manufacturer (IV-D-2) explained that calculating VOC content of every formulation would be an excessive requirement and asked that ink manufacturers be allowed to submit general type formulations and to approximate VOC content. This standard makes no requirements on ink manufacturers. However, it is anticipated that, by allowing operators of affected facilities to use inventory and purchase records to account for VOC content and by easing the requirement to account for the content of each ink as used at the print head, this commenter (IV-D-5) may find some relief.

2.10 REPORTING AND RECORDKEEPING

2.10.1 Comment: One commenter (IV-D-10) requested that the performance averaging period for waterborne inks be defined as "a calendar month or other comparable period on a routine basis." He enclosed a 1983 calendar illustrating his company's 4-4-5 calendar for all accounting, production, and marketing records. Using this system, each quarter consists of 2 months with four weeks and one month with five weeks. He pointed out that this standard 4-4-5 cycle permitted a uniform system for statistical analysis although it does not follow a true "calendar" month, and the emission rates are not affected since the rate number is not time dependent but based on production or hours of operation. He felt that under this system, only the reporting cycle is changed and record retention is facilitated and is more readily available by accommodating the 4-4-5 calendar rather than a strict calendar month system.

Response: EPA agrees that it would be desirable to facilitate a plant's recordkeeping by accommodating this suggestion. The regulation has been changed so that the weighted average "shall be calculated over a period that does not exceed one calendar month, or four consecutive weeks. A facility that uses an accounting system based on quarters consisting of two 28 calendar day periods and one 35 calendar day period may use an averaging period of 35 calendar days four times per year provided the use of such an accounting system is documented in the initial performance test results."